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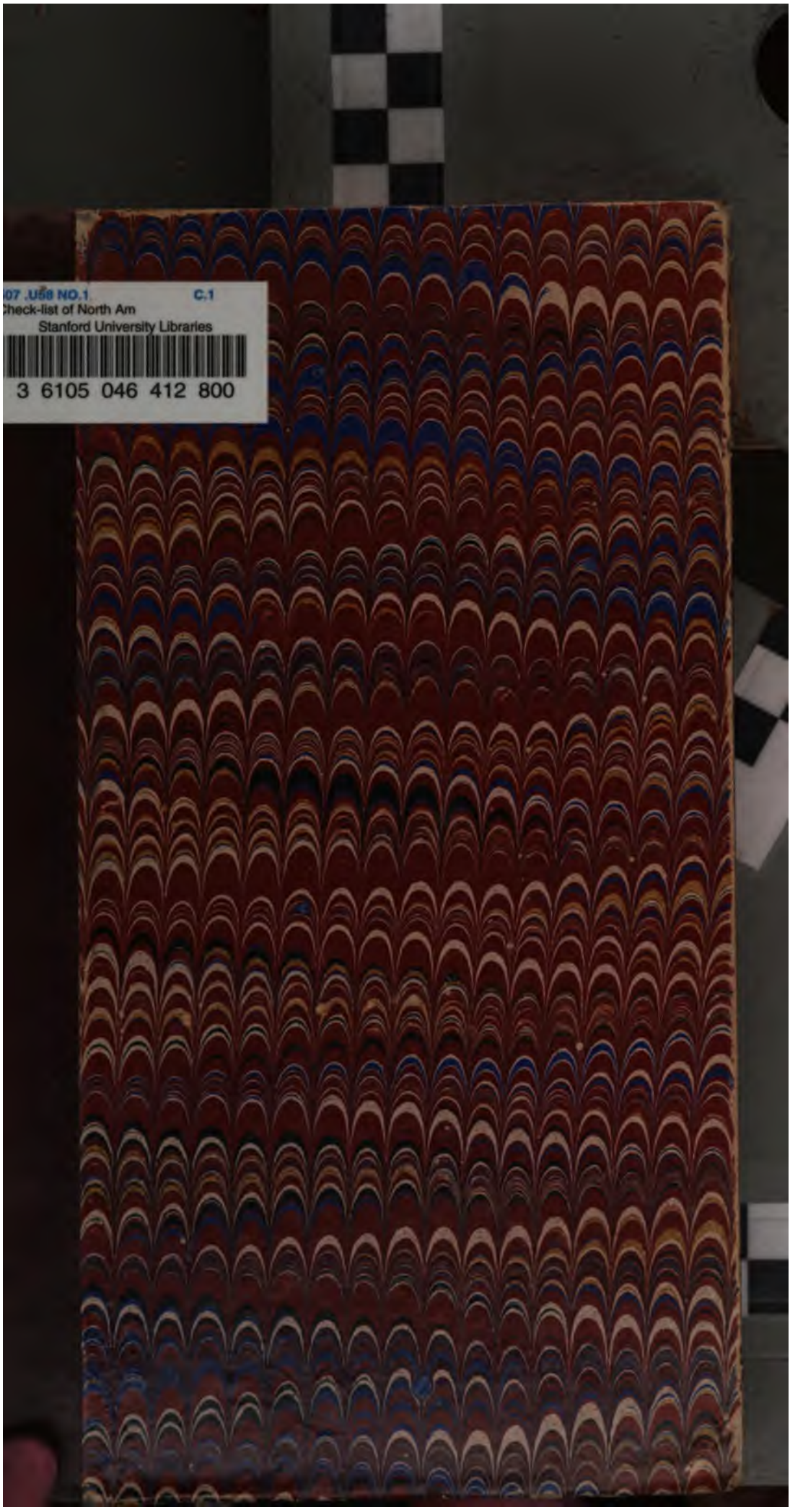
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BULLETIN

OF THE

UNITED STATES NATIONAL MUSEUM.

PUBLISHED UNDER THE DIRECTION OF THE SMITHSONIAN INSTITUTION.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1875.

Department of the Interior:

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— 1 —

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1875.

H

CHECK-LIST

OF

NORTH AMERICAN BATRACHIA AND REPTILIA;

WITH A

SYSTEMATIC LIST OF THE HIGHER GROUPS,

AND AN

ESSAY ON GEOGRAPHICAL DISTRIBUTION.

BASED ON

THE SPECIMENS CONTAINED IN THE U. S. NATIONAL MUSEUM.

By EDWARD D. COPE.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1875

ADVERTISEMENT.

This work is the first of a series of papers intended to illustrate the collections of Natural History and Ethnology belonging to the United States and constituting the National Museum, of which the Smithsonian Institution was placed in charge by the act of Congress of August 10, 1846.

It has been prepared at the request of the Institution, and printed by authority of the honorable Secretary of the Interior.

JOSEPH HENRY,
Secretary Smithsonian Institution.

SMITHSONIAN INSTITUTION,
Washington, November, 1875.

SMITHSONIAN INSTITUTION

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INTRODUCTORY REMARKS.

The present contribution to North American Herpetology is a prodromus of a general work on that subject, undertaken some years ago at the request of the Secretary of the Smithsonian Institution. The material which has been accumulating in the museum of that Institution has offered great advantages for the investigation of the questions of anatomical structure, variations of specific characters, and geographical distribution. It is believed that these subjects are much elucidated by the study of the *Batrachia* and *Reptilia*, since these animals are especially susceptible to physical influences; since, also, they are unable, like birds, and generally not disposed, as are mammals, to make extended migrations, their habitats express nearly the simplest relations of life to its surroundings.

In prosecuting these investigations, it has become necessary to adapt the nomenclature to the results obtained by study of many specimens as to the variation of species. It is a common observation that the better a species of animal is represented in our collections, the wider do we discover its range of variation to be, and the greater the number of supposed distinct species does it become necessary to reduce to the rank of varieties. The definition of a species being simply a number of individuals, certain of whose physical peculiarities belong to them alone, and are at the same time exhibited by all of them, it is evident that, since it is impossible, in the present state of our knowledge, to predicate what those "certain peculiarities" shall be, the only test of specific definition is the constancy of those characters. Hence it is that the most diverse forms of one species may differ more from each other than two recognized species. In the investigation of North American cold-blooded *Vertebrata*, I have observed that many species are represented by well-marked geographical varieties, which, following the example of some ornithologists, I have called *subspecies*. Many of these have been heretofore regarded as species.

In illustration of these remarks, certain species of the genus *Ophibolus* may be selected. The most northern and the most southern forms of the

genus, the *O. triangulum* and *O. coccineus*, have always been regarded as distinct species; and so numerous are their differential characters, in coloration, size, and squamation, that this view would seem to rest on a satisfactory foundation. I find, however, that individuals exist which represent every stage of development of each character which distinguishes them, although certain types appear to be more abundant than the intermediate ones. *O. triangulum* is a species of larger size, with two temporal plates, a row of large dorsal spots, and other smaller ones on the sides, on a grayish ground; with a chevron, and often other marks on the top of the head, and a band posterior to the eye. *O. coccineus* is a small snake with a small loreal plate and one temporal shield; color red, with pairs of black rings extending round the body, and no markings on the head excepting that the anterior ring of the anterior pair crosses the posterior edge of the occipital shields, forming a half collar. The transition is accomplished thus: The lateral borders of the dorsal spots of *O. triangulum* break up, and the lateral spots become attached to their anterior and posterior dark borders. The chevron of the top of the head first breaks into spots, and then its posterior portions unite with each other. The borders of the old dorsal spots continue to the abdomen, where the remaining lateral portions finally meet on the middle line, forming a black line. This breaks up and disappears, leaving the annuli open; and these are then completed in many specimens. The general colors become more brilliant and the size smaller. The head is more depressed; in immediate relation to this form, the loreal plate is reduced in size, and the two temporal shields of *O. triangulum* are reduced to one. Every form of combination of these characters can be found, which represent six species of the books (in North America), viz: *O. triangulum*, *O. doliatus*, *O. annulatus*, *O. gentilis*, *O. amaurus*, and *O. coccineus*. The oldest name is the *O. doliatus*, Linn. Another series of specimens resemble very closely those of the subspecies *coccineus;* in fact, are identical with them in color. The loreal shield is, however, extinguished, and the rows of scales are reduced by one on each side. These specimens simply carry one degree further the modifications already described. Yet, on account of the constancy of these characters, I am compelled to regard these individuals not only as a distinct species, but, on account of the absence of the loreal plate, as belonging to another genus. This is the *Calamaria elapsoidea* of Holbrook; the *Osceola elapsoidea* of Baird and Girard. It affords an illustration of the principle, which I have elsewhere insisted on, "that adjacent species of allied genera may be more alike

species of identical generic characters," which indicates that generic characters originate independently of the specific.*

The classification of the present list is illustrated by the above remarks. I now briefly allude to the rules I have followed in adopting a nomenclature. These rules are those in general use in the United States, as based on the revision of the rules of the British Association for the Advancement of Science by a committee of the American Association, and elaborated in more detail by W. H. Edwards,† after Thorell and Wallace; in other words, the law of priority is followed under the following definitions:

(1) A specific name given by an author must relate to a description or plate of the object intended.

(2) A generic name of a species must be accompanied by a separate definition of the genus intended, by reference to some of its distinctive features.

NOTE.—These two rules are properly regarded as the safeguards of nomenclature, since they offer the only means by which the writings of authors in the sciences concerned can be intelligible. The necessity of these rules will become increasingly apparent, since, as the systematic sciences become more popular, sciolists may publish pages of names in any of their departments, with the effect, should such names be authoritative, of indefinitely postponing the cultivation of the subject. A generic diagnosis is not necessarily perfect in the early stages of the classification of a science, and may be found later to embrace more than one generic type; hence, the following additional rule has been found necessary:

(3) In the subdivision of a genus, names of the new genera are to be adopted in the order of priority of the definition of the divisions to which they refer; the remaining natural generic group retaining the original name, unless the latter has been already given to one of the divisions, as prescribed.

(4) Priority reposes on date of publication, and not on date of reading of papers.

Of course, consistently with the above rules, as divisions of high rank must be defined in order to be understood, names of these unaccompanied by definitions are not binding on the nomenclator.

In regard to orthography, the same code of rules has been followed, viz, in the Latinization of all words of Greek derivation. This has been

*Origin of Genera, Philadelphia, 1868.

†The Canadian Entomologist, 1873, p. 32.

applied especially to the compounding of family-names. Thus, if the generic name is spelled according to Latin rule, the family-name derived from it must be so also; hence, I write *Scaphiopidae*, not Scaphiopodidae; *Rhinoceridae*, not Rhinocerotidae.

In the check-list, the correct name of each species and subspecies is given with reference to a good description. To each is added its geographical range.

PART I.

ARRANGEMENT

OF

THE FAMILIES AND HIGHER DIVISIONS

OF

BATRACHIA AND REPTILIA.

[ADOPTED PROVISIONALLY BY THE SMITHSONIAN INSTITUTION.]

CLASS BATRACHIA.

Order ANURA.

(Anura, Duméril; Salientia, Merrem, Gray.)

RANIFORMIA.

(Raniformia, Cope, Nat. Hist. Rev., v, 114, 1865.[1])

Ranidae = Ranidae, Cope, N. H. Rev., v, 114–119, 1865.[2]

Colostethidae = Colostethidae, Cope, P. A. N. S. Phila., 1866, 130.[3]

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[1] **Raniformia, partim, Dum. et Bib., Erp. Gén.**

[2] **Ranidae, Cope, Jour. Acad. Nat. Sci. Phila., n. s., vi, 169, 1867; Ranidae, Polypedatidae, and Cystignathidae, pars, Gthr., Cat. Bat. Salien., 1858, 4-26.**

[3] **Colostethidae, Cope, Jour. Acad. Nat. Sci. Phila., n. s., vi, 197, 1867; "Calostethidae," Mivart, Proc. Zoöl. Soc. London, 1869.**

FIRMISTERNIA.[4]

(Bufonoid Raniformia, Cope, Jour. Acad. Nat. Sc. Phila., n. s., vi, 190, 1867.)

Dendrobatidae = Dendrobatidae, Cope, N. H. Rev., v, 103–104, 1865.[5]

Phryniscidae = Phryniscidae, Cope, J. A. N. S. Phila., n. s., vi, 190, 1867.[6]

Engystomidae = Engystomidae, Cope, J. A. N. S. Phila., n. s., vi, 190, 1867.[7]

Brevicipitidae = Brevicipitidae, Cope, J. A. N. S. Phila., n. s., vi, 190, 1867.[8]

GASTRECHMIA.

(Gastrechmia, Cope, J. A. N. S. Phila., n. s., vi, 198, 1867.)

Hemisidae = Hemisidae, Cope, J. A. N. S. Phila., n. s., vi, 198–199, 1867.[9]

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[4] Firmisternia. Believing the arciferous or raniform sternal structure to have about equal systematic value with the presence or absence of teeth, I have separated the toothless families with raniform sternum under the name of Firmisternia. It is not impossible that this group may turn out to be inseparable from the Gastrechmia. The toothed Aglossa must be distinguished on the same principle from Pipa, and the suborder is accordingly named Odontaglossa.

[5] Hylaplesiidae, Gthr., Cat. Bat. Salien., 1858, 124–126.

[6] Brachycephalina, pars, Gthr., Cat. Bat. Salien., 1858, 42.

[7] Engystomidae, Cope, N. H. Rev., v, 100–101, 1865; Michrylidae, Brachymeridae, Engystomatidae, Hylaedactylidae, Gthr., Cat. Bat. Salien., 1858.

[8] Brachymeridae, Cope, pars, N. H. Rev., v, 101–102, 1865.

[9] Hemisidae; Rhinophrynidae, Cope, pars, N. H. Rev., v, 100, 1865; Rhinophrynidae et Phryniscidae, pars, Mivart, Proc. Zoöl. Soc. London, 1869, 281–288.

BUFONIFORMIA.

(Bufoniformia, Duméril et Bibron, partim; Cope, partim.)

Rhinophrynidae = Rhinophrynidae, Gthr., Cat. Bat. Sal. B. M., 127, 1858.[10]

Bufonidae = Bufonidae, Cope, N. H. Rev., v, 102–103, 1865.[11]

Batrachophrynidæ = Batrachophrynus, Peters, Monatsb. Pr. Akad. Wiss., 1873, 411.

AGLOSSA.

Pipidae = Pipidae, Gthr., Cat. Bat. Sal. B. M., 2–3, 1858.[12]

ODONTAGLOSSA.

Dactylethridae = Dactylethridae, Gthr., Cat. Bat. Sal. B. M., 1–2, 1858.[13]

ARCIFERA.

(Arcifera, Cope, N. H. Rev., v, 104, 1865.[14])

Cystignathidae = Cystignathidae, Cope, N. H. Rev., v, 105, 1865.[15]

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[10] **Rhinophrynidae, Cope, N. H. Rev., v, 100, 1865, pars, nec Mivart; Cope, Jour. Acad. Nat. Sci. Phila., vi, 189, 1867.**

[11] **(Bufonidae) Chelydobatrachus, Gthr., Cat. Bat. Salien., part., 1858, 51, 53–54.**

[12] **Pipidae, Cope, N. H. Rev., v, 98–99, 1865; Pipidae, Mivart, Proc. Zoöl. Soc. London, 1869, 287, 295.**

[13] **Dactylethridae, Cope, N. H. Rev., v, 99, 1865; Dactylethridae, Mivart, Proc. Zoöl. Soc. London, 1869, 295.**

[14] **Arcifera, Cope, Jour. Nat. Sci. Phila., vi, 67–68, 1866.**

[15] **Cystignathidae, Ranidae partim, Cystignathidae, Uperoliidae, Bombinatoridae partim, Alytidae partim, Hylodidae, Gthr.; Ranidae partim, Polypedatidae partim, Discoglossidae partim, Mivart, Proc. Zoöl. Soc. London, 1869.**

Hemiphractidae	= Hemiphractidae, Cope, J. A. N. S. Phila., n. s., vi, 69, 1866.
Hylidae	> Hylidae, Gthr., Cat. Bat. Salien., 96, 1858.[16]
Scaphiopidae	= Scaphiopodidae, Cope, J. A. N. S. Phila., n. s., vi, 69, 1866.[17]
Pelodytidae	= Pelodytidae, Cope, J. A. N. S. Phila., vi, 69, 1866.[18]
Asterophrydidae	= Asterophrydidae, Cope, J. A. N. S. Phila., n. s., vi, 79–80.[16a]
Discoglossidae	= Discoglossidae, Cope, N. H. Rev., v, 105–107, 1865.[19]

Order STEGOCEPHALI.

(Stegocephali, Cope, P. A. N. S. Phila., 1868, 209.[20])

Labyrinthodontia.

Baphetidae	= *Baphetidae*, Cope, MSS.
Anthracosauridae	= *Anthracosauridae*, Cope, MSS.

Ganocephala.

Colosteidae	= Colosteidae, Cope, MSS.[21]

[16] Hylidae, Cope, T. A. N. S. Phila., vi, 83–85, 1866.

[17] Scaphiopodidae partim, N. H. Rev., v, 107–108, 1865.

[18] Pelodytidae. Scaphiopodidae pars, Cope, olim, Jour. Acad. Nat. Sci. Phila., vi, 69, 1866.

[19] Discoglossidae, Cope, Jour. Acad. Nat. Sci. Phila., vi, 69, 1866; Discoglossidae partim, 34, Bombinatoridae partim et Alytidae partim Gthr., Cat. Bat. Salien., 40, 57, 1858; Mivart, Proc. Zoöl. Soc. London, 1869, 294-295

[20] Stegocephali, Cope, Trans. Am. Phil. Soc. 1870, 6-7.

[21] Colosteus, Cope.

MICROSAURIA.

Phlegethontiidae	= *Phlegethontiidae*, Cope, MSS.[21a]
Molgophidae	= *Molgophidae*, Cope, MSS.[22]
Ptyoniidae	= *Ptyoniidae*, Cope, MSS.[23]
Tuditanidae	= *Tuditanidae*, Cope, MSS.
Peliontidae	= *Peliontidae*, Cope, MSS.[24]

Order GYMNOPHIDIA.

(Gymnophiona, Müller.)

Caeciliidae	= Caeciliidae, Gray, Cat. Bat. Grad. B. M., 57, 1850.

Order URODELA.

Pleurodelidae	= { Seiranotidae, Pleurodelidae, } Gray, P. Z. S. London, xxvi, 137–143, 1858.
Salamandridae[25]	= Salamandridae, Gray, P. Z. S. London, xxvi, 142–143, 1858.
Hynobiidae[26]	= Hynobiidae, Cope, J. A. N. S. Phila., n. s., vi, 107, 1866.
Desmognathidae	= Desmognathidae, Cope, J. A. N. S. Phila., n. s., vi, 107, 1866.
Thoriidae	= Thoriidae, Cope, P. A. N. S. Phila., 1869, 111–112.

[21a] Phlegethontia, Cope.
[22] Molgophis, Cope.
[23] Lepterpeton, Huxl.; Oestocephalus, Cope; Urocordylus, Huxl.
[24] Pelion, Wyman.
[25] Salamandridae, Cope, Jour. Acad. Nat. Sci. Phila., vi, 107–108, 1866.
[26] Hynobiidae, Cope; Molgidae, Gray, 1850.

Plethodontidae[27] = Plethodontidae, Cope, J. A. N. S. Phila., n. s., vi, 106–107, 1866.

Amblystomidae[28] = Amblystomidae, Cope, J. A. N. S. Phila., n. s., vi, 105–106, 1866.

Menopomidae = Protonopsidae, Gray, Cat. Bat. Grad. B. M., 52–54, 1850.

Amphiumidae = Amphiumidae, Cope, J. A. N. S. Phila., n. s., vi, 104–105, 1866.

Cocytinidae = *Cocytinidae*, Cope, MSS.[29]

Order PROTEIDA.

Proteidae = Proteidae, Gray, Cat. Bat. Grad. B. M., 64–67, 1850.

Order TRACHYSTOMATA.

Sirenidae = Sirenidae, Gray, Cat. Bat. Grad. B. M., 67–69, 1850.

Class REPTILIA.

Order ORNITHOSAURIA.

(Ornithosauria, Bonaparte, Fitzinger, Seeley.[30])

Dimorphodontidae = Dimorphodontidae, Cope, P. A. A. A. S. 1870, 234, 1871.[31]

[27] Plethodontidae, Cope, Jour. Acad. Nat. Sci. Phila., vi, 106, 1866, partim Gray, 1850.
[28] Amblystomidae. Plethodontidae partim, Gray, 1850.
[29] Cocytinus, Cope, Trans. Am. Philos. Soc. Phila., 1874.
[30] Ornithosauria = Pterosauria, Owen.
[31] Dimorphodontae, Seeley.

Pterodactylidae = Pterodactylidae, Cope, P. A. A. A. S., xix, 234, 1871.[32]

Order DINOSAURIA.

(Dinosauria, Owen, Cope, Seeley; *Pachypodes*, Meyer; Ornithoscelida, Huxley.)

Symphypoda.

(Symphypoda, Cope; Compsognatha, Huxley.)

Compsognathidae = *Compsognathidae*, Cope, P. A. A. A. S., xix, 234, 1871[33] (name only).

Ornithotarsidae = *Ornithotarsidae*, Cope, P. A. A. A. S., 234, 1871[34] (name only).

Goniopoda.

(Goniopoda, Cope; Harpagmosauria, Haeckel.)

Megalosauridae = *Megalosauridae*, Cope, P. A. A. A. S., xix, 234, 1871 (name only).[35]

Teratosauridae = *Teratosauridae*, Cope, P. A. A. A. S., xix, 234, 1871 (name only).[36]

Orthopoda.

(Orthopoda, Cope; Therosauria, Haeckel.)

Scelidosauridae = *Scelidosauridae*, Cope, T. A. P. S., n. s., xiv, 91, 1869.[37]

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[32] Rhamphorhynchae et Pterodactylae, Seeley, loc. cit.
[33] Compsognathidae = Compsognathus, Wag.
[34] Ornithotarsidae = Ornithotarsus, Cope.
[35] Megalosauridae, Huxley.
[36] Teratosaurus, Plateosaurus, Meyer, etc.
[37] Scelidosauridae, Huxley, Journ. Geol. Soc. London, 1870.

Iguanodontidae = *Iguanodontidae*, Cope, T. A. P. S., n. s., xiv, 91, 1869.[38]

Hadrosauridae = *Hadrosauridae*, Cope, T. A. P. S., n. s., xiv, 91–98, 1869.[39]

Order CROCODILIA.

(Crocodilia et Thecodontia, partim, Owen, 1841.)

PARASUCHIA.

Belodontidae = *Belodontidae*, Cope, P. A. A. A. S., xix, 234, 1871 (name only).[40]

AMPHICOELIA.

Teleosauridae = *Teleosauridae*, Cope, P. A. A. A. S., xix, 234, 1871 (name only).

Goniopholididae = *Goniopholis*, Owen, etc.

PROCOELIA.

Thoracosauridae = *Thoracosauridae*, Cope, P. A. A. A. S., xix, 235, 1871 (name only).[41]

Crocodilidae = Crocodilidae, Cope, P. A. A. A. S., xix, 235, 1871 (name only).[42]

Order SAUROPTERYGIA.

(Sauropterygia, Owen.)

?*Placodontidae* = *Placodontidae*, Cope, P. A. A. A. S., xix, 235, 1871 (name only).[43]

[38] Iguanodontidae, Huxley, Journ. Geol. Soc. London, 1870.

[39] Hadrosauridae, Huxley, Journ. Geol. Soc. London, 1870.

[40] Thecodontia, Owen, pt.; Cope, Tr. A. P. S., 1869, 32.

[41] Thoracosaurus, Leidy, Cope.

[42] Crocodilidae + Alligatoridae, Gray, + Gavialidae, Gray, + Holops and Thecachampsa, Cope, etc., Pr. A. A. A. S., xix, 235, 1871.

[43] Placodus, Agass.

Plesiosauridae = *Plesiosauridae*, Cope, P. A. A. A. S., xix, 235, 1871 (name only).[44]

Elasmosauridae = *Elasmosauridae*, Cope, Tr. A. P. S., n. s., xiv, 1869, p. 47.[45]

Order ANOMODONTIA.

(Anomodontia, Owen.)

Dicynodontidae = *Dicynodontidae*, Cope, P. A. A. A. S., xix, 235, 1871 (name only).[46]

Oudenodontidae = *Oudenodontidae*, Cope, P. A. A. A. S., xix, 235, 1871 (name only).[47]

Order ICHTHYOPTERYGIA.

Ichthyosauridae = *Ichthyosauridae*, Cope, P. A. A. A. S., xix, 235, 1871.

Order RHYNCHOCEPHALIA.

Protorosauridae = *Protorosauridae*, Cope, P. A. A. A. S., xix, 235, 1871 (name only).[48]

Sphenodontidae = Sphenodontidae, Cope, P. A. A. A. S., xix, 235, 1871.[49]

Rhynchosauridae = *Rhynchosauridae*, Cope, P. A. A. A. S., xix, 235, 1870 (name only).[50]

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[44] Nothosaurus, Pistosaurus, Plesiosaurus, Pliosaurus, etc.
[45] Elasmosaurus, Cimoliasaurus, etc.
[46] Dicynodontidae, Owen, Paleontology.
[47] Cyptodontia, Owen, Paleontology.
[48] Protorosaurus, Meyer (elongate sacrum).
[49] Hatteriidae, Cope, Proc. Acad. Nat. Sc. Phila., 1864, 225-7.
[50] Rhynchosaurus, Owen.

Order TESTUDINATA.

ATHECAE.

(Athecae, Cope, P. A. A. A. S., xix, p. 235, 1870.)

Sphargididae = Sphargididae, Gray, Ann. Philos., 1825.[51]

Protostegidae = Protostega, Cope, Proc. A. P. S., 1872, 413.

CRYPTODIRA.

Cheloniidae = Cheloniidae, Gray, Annals Philosophy, 1825.[52]

Propleuridae = *Propleuridae*, Cope, Am. Jour. Sc. and Arts, l, 137, 1870.

Trionychidae = Trionychidae, Gray, Annals of Philosophy, 1825.[53]

Emydidae = Emydidae, Agassiz, Cont. Nat. Hist. U. S., i, p. 351.[54]

Chelydridae = Chelydridae, Agassiz, Contrib. N. H. U. S., i, 341.[54a]

Cinosternidae = Cinosternidae, Agassiz, Cont. Nat. Hist. U. S., i, 347.

Testudinidae = Testudinidae, Cope, P. A. N. S. Phil., 1868, p. 282.[55]

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[51] Sphargididae, Bell, Fitzinger, Agassiz.

[52] Cheloniidae, Gray, Ann. Phil., 1825; Agass., Cope, P. A. A. A. S., xix, 235, 1871.

[53] Trionychidae, Bell, Wiegmann, Dum. et Bibr., Agass.

[54] Emydidae—Chelydridae, Cope, P. A. A. A. S., xix, 235, 1871 (name only).

[54a] Chelydra, Cope, P. A. N. S. Phila., 1872.

[55] Testudinidae, Gray, Agass.

Pleurosternidae = *Pleurosternidae*, Cope, P. A. N. S. Phila., 1868, 282 (name only).

Adocidae = *Adocidae*, Cope, P. A. P. S., 1870, 547.

PLEURODIRA.

(Pleurodira, Dum. et Bibron; Chelyoidae, Agass.)

Podocnemididae = Podocnemididae, Cope, P. A. N. S. Phila., 1868, 282.

Chelydidae = Chelydidae, Gray, P. Z. S. London, 1869, pp. 208–209.

Hydraspididae = Hydraspididae, Cope, P. A. N. S. Phila., 1868, 282.

Pelomedusidae = Pelomedusidae, Cope, P. A. N. S. Phila., 1865, 185; 1868, p. 119.

Sternothaeridae = Sternothaeridae, Cope, P. A. N. S. Phila., 1868, 119.

Order LACERTILIA.

(Lacertilia, Owen; Cope, P. A. A. A. S., xix, 236, 1870.)

RHIPTOGLOSSA.

(Acrodonta Rhiptoglossa, Wiegmann, Fitzinger, Cope; Chamaeleonida, Müller.)

Chamaeleontidae = Chamaeleontidae, Gray, Cat. Lizards B. M., 1845, 264 (name only).[56]

[56] Wiegmann, Gray, etc.

PACHYGLOSSA.

(Pachyglossa, Cope; Acrodonta Pachyglossa, Wagler, Fitzinger, Cope, P. A. N. S. Phila., 1864, 226–227.)

Agamidae = Agamidae, Gray, Cat. B. M., 1845, 230.

NYCTISAURA.

(Nyctisaura, Gray, Cat. Lizards B. M.; Cope, P. A. N. S. Phila., 1864, 225.)

Gecconidae = Gecconidae, Gray, Cat. Lizards B. M., 1845, 142.[57]

PLEURODONTA.

(Pleurodonta, Cope, P. A. N. S. Phila., 1864, 226.)

a. *Iguania.*

Anolidae = Anolidae, Cope, P. A. N. S. Phila., 1864, 227, 228.

Iguanidae = Iguanidae, Cope, P. A. N. S. Phila., 1864, 227, 228.[58]

b. *Diploglossa.*

Anguidae = Anguidae, Cope, P. A. N. S. Phila., 1864, 228.

Gerrhonotidae = Gerrhonotidae, Cope, P. A. N. S. Phila., 1864, 228.[59]

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[57] Cope, Pr. A. A. A. S., xix, 396, 1871.

[58] Iguanidae pars anomorum.

[59] Gerrhonotidae pt., Gray.

Xenosauridae	= Xenosauridae, Cope, P. A. N. S. Phila., 1866, 322.
Helodermidae	= Helodermidae, Gray, Cat. Lizards B. M., 1845.[60]

c. *Thecaglossa.*

(Thecaglossa, Wagler, Fitzinger, Cope.)

Varanidae	= Varanidae, Cope, P. A. A A. S., xix, 237, 1870.

d. *Leptoglossa.*

(Leptoglossa, Wiegmann, Fitzinger, Cope.)

Teidae	= Teidae, Cope, P. A. A. A. S., xix, 237, 1871.[61]
Lacertidae	= Lacertinidae, Gray, Cat. Lizards B. M., 26–44, 1845.[62]
Zonuridae	= Zonuridae, Cope, P. A. A. A. S., xix, 237–241, 1871.[63]
Chalcidae	= Chalcidae, Gray, Cat. Lizards B. M., 57–58, 1845.[64]
Scincidae	= Scincidae, Gray, Cat. Lizards B. M., 70–120, 1845.[65]
Sepsidae	= Sepsidae, Gray, Cat. Lizards B. M., 121–126, 1845.[66]

[60] Helodermidae, Cope, Proc. Acad. Nat. Sc. Phila., 1864, 228; 1866, 322.

[61] Teidae and Ecpleopodidae, Peters, Cope (Proc. Acad. Nat. Sci. Phila., 1864, 229); Teidae, Anadiidae, Cercosauridae, Riamidae, Gray.

[62] Lacertidae, Cope, Proc. Acad. Nat. Sci. Phila., 1864, 228; Lacertidae et Cricosauridae, Peters; Xantusiidae, Baird.

[63] Zonuridae, pt., Gray; Lacertidae pt., Cope.

[64] Chalcididae, Cope, Proc. Acad. Nat. Sci. Phila., 1864, 228.

[65] Scincidae, Cope, Proc. Acad. Nat. Sci. Phila., 1864, 228.

[66] Sepsidae, Cope, Proc. Acad. Nat. Sci. Phila., 1864, 228.

e. *Typhlophthalmi.*

(Typhlophthalmi, Cope, P. A. N. S. Phila., 1864, 228.[67])

Feyliniidae = Anelytropidae, Cope, P. A. N. S. Phila., 1864, 230.[68]

Acontiidae = Acontiadae, Gray, Cat. Lizards B. M., 126–127, 1845.[69]

Aniellidae = Aniellidae, Cope, P. A. N. S. Phila., 1864, 230.

Opheosauri.

(Opheosauri, Cope, P. A. N. S. Phila., 1864, 226.[70])

Amphisbaenidae = Amphisbaenidae, Gray, Cat. Tort. Croc., etc. B. M., 69, 1844.[71]

Trogonophidae = Trigonophidae, Gray, Catal. Tort. Croc., etc. B. M., 68, 1844.[72]

Order PYTHONOMORPHA.

(Pythonomorpha, Cope, T. A. P. S., n. s., xiv, 175–182, 1870.[73])

Mosasauridae > *Mosasauridae*, Cope, T. A. P. S., n. s., xiv, 182–211, 1870.

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[67] Typhlophthalmi, pars., Dum. et Bib., Erp. Gen.

[68] Typhlinidae, Gray.

[69] Acontiidae, Cope, Proc. Acad. Nat. Sci. Phila., 1864, 230.

[70] Ophisauri, Merrem; Annulati, Wiegmann; Ptychopleures Glyptodermes, Dum. et Bib.; Amphisbaenoidea, Müller.

[71] Amphisbaenidae, Wiegmann.

[72] Trogonophes, Wiegmann, Fitzinger.

[73] Pythonomorpha, Cope, Proc. Bost. Nat. Hist. Soc., 1869, 251; Lacertilia Natantia, Owen, Paleontographical Soc. Cretaceous Reptiles.

Order OPHIDIA.

SCOLECOPHIDIA.

(Scolecophidia, Dum. et Bib.[74])

Typhlopidae = Typhlopidae, Cope, P. A. A. A. S., xix, 237, 1871 (name only).[75]

Stenostomidae = Stenostomidae, Cope, P. A. A. A. S., xix, 237, 1871 (name only).[76]

TORTRICINA.

(Tortricina, Müller.[77])

Tortricidae = Tortricidae, Cope, P. A. N. S. Phila., 1864, 230.

Uropeltidae = Uropeltidae, Cope, P. A. N. S. Phila., 1864, 230.[78]

ASINEA.

(Asinea, Müller, Cope.)

a. *Peropoda.*

(Peropoda, Müller.)

Xenopeltidae = Xenopeltidae, Cope, P. A. N. S. Phila., 1864, 230.[79]

Pythonidae = Pythonidae, Cope, P. A. N. S. Phila., 1864, 230.[80]

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[74] Scolecophidia et Catodonta, Cope, Proc. Acad. Nat. Sci. Phila., 1864, 230.
[75] Epanodontiens, Dum. et Bib.
[76] Catodontiens, Dum. et Bib.; Catodonta, Cope, olim.
[77] Tortricina, Cope, Proc. Acad. Nat. Sci. Phila., 1864, 230.
[78] Uropeltacea, Peters; Rhinophidae, Gray.
[79] Xenopeltidae, Gthr., Reptiles British India.
[80] Holodontiens, Dum. et Bib.

Boidae	= Boidae, Cope, P. A. N. S. Phila., 1864, 230.[81]
Lichanuridae	= Lichanuridae, Cope, P. A. N. S. Phila., 1868, 2.

b. *Colubroidea.*

Achrochordidae	= Achrochordidae, Cope, P. A. N. S. Phila., 1864, 231.[82]
Homalopsidae	= Homalopsinae, Cope, P. A. N. S. Phila., 1864, 167.[83]
Colubridae	= Colubridae, Cope, P. A. A. A. S., xix, 238, 1870.[84]
Rhabdosomidae	= Rhabdosomidae, Cope, P. A. A. A. S., xix, 238, 1870.[85]

PROTEROGLYPHA.

a. *Conocerca.*

Elapidae	= Elapidae, Cope, P. A. N. S. Phila., 1864, 231.[86]
Najidae	= Najidae, Cope, P. A. N. S. Phila., 1864, 231.[87]

[81] Aproterodontiens, Dum. et Bib.

[82] Achrochordiens, Dum. et Bib.

[83] Natricidae, pars, Gthr., Cat. Col. Snakes B. M., 1858, 50–54. Potamophilidae, Jan.

[84] Asinea, Group 3–10, Cope, Proc. Acad. Nat. Sci. Phila., 1864, 251: Calamaridae, Oligodontidae, Coronellidae, Colubridae, Dryadidae, Dendrophididae, Dryiophilidae, Psammophididae, Lycodontidae, Scytalidae, Dipsadidae, etc., Gthr., Cat. Col. Snakes B. M., 1858, et op. alt.

[85] Calamaridae partim, Gthr., Cat. Col. Snakes B. M., 1858, 9–22.

[86] Elapidae (pars), Gthr., Cat. Col. Snakes B. M., 1858, 309–327.

[87] Elapidae (pars altera), Gthr., Cat. Col. Snakes B. M., 1858, 309–327.

b. *Platycerca.*

Hydrophidae	= Hydridae, Gray, Cat. Snakes B. M., 2, 35, 40, 1849.[88]

SOLENOGLYPHA.[89]

(Solenoglypha, Dum. et Bib.)

Atractaspididae	= Atractaspididae, Gthr., Cat. Snakes B. M., 239, 1858.[90]
Causidae	= Causidae, Cope, P. A. N. S., Phila., 1859, 334.
Viperidae	= Viperidae, Gray, Cat. Brit. Mus., p. 18.[91]
Crotalidae	= Crotalidae, Gray, Cat. Brit. Mus.[92]

[88] Hydridae, Gray; Hydrophidae, Schmidt, Fischer; Cope, Proc. Acad. Phila., 1859 333.

[89] Viperidae, Cope, Proc. Acad. Nat. Sci. Phila., 1859, 333.

[90] Atractaspidinae, Cope, Proc. Acad. Nat. Sci. Phila., 1859, 334.

[91] Viperinae, Cope, Proc. Acad. Nat. Sci. Phila., 1859; Günther.

[92] Crotalinae, Cope, Proc. Acad. Nat. Sci. Phila., 1859; Günther, Cat. Col. Snakes B. M. et auctorum.

PART II.

CHECK-LIST

OF

THE SPECIES OF BATRACHIA AND REPTILIA

OF

THE NEARCTIC OR NORTH AMERICAN REALM.

BATRACHIA.

TRACHYSTOMATA.

SIRENIDAE.

SIREN, Linn.

Siren lacertina, Linn.; Holbrook, N. Am. Herpetology, vol. v, p. 101. The Austroriparian region; extreme points North Carolina, Florida, Matamoras, Mexico, and Alton, Illinois.

PSEUDOBRANCHUS, Gray.

Pseudobranchus striatus, LeConte; Holbrook, American Herpetology, vol. v, p. 109. Georgia.

PROTEIDA.

PROTEIDAE.

NECTURUS, Raf.

Necturus lateralis, Say; Holbrook, Am. Herp., vol. v, pp. 111, 115. Eastern region except New England and eastern Middle States; from a few points in the Austroriparian.

Necturus punctatus, Gibbes. Eastern South Carolina.

CADUCIBRANCHIATA.

AMPHIUMIDAE.

AMPHIUMA, Linn.

Amphiuma means, Linn.; Holbrook, Am. Herp., v, p. 89. Austroriparian region, from North Carolina to Mississippi.

MURAENOPSIS, Fitzinger.

Muraenopsis tridactylus, Cuvier; Holbrook, Am. Herp., v, p. 93. Mississippi and Louisiana.

MENOPOMIDAE.

MENOPOMA, Harl.

Menopoma allegheniense, Harl.; Holbrook, Am. Herp., v, p. 95. All tributaries of the Mississippi, and streams of the Louisianian district to North Carolina.

Menopoma fuscum, Holbrook, Am. Herp., v, p. 99. Headwaters of the Tennessee River.

AMBLYSTOMIDAE.

AMBLYSTOMA, Tschudi.

Amblystoma talpoideum, Holbrook; Cope, Proceedings Academy Philadelphia, 1867, p. 172. Austroriparian region; mountains of South Carolina.

Amblystoma opacum, Gravenhorst; Cope, Proceed. Acad. Phila., 1867, p. 173. From Pennsylvania to Florida, to Wisconsin, and to Texas.

Amblystoma punctatum, Linn.; Cope, loc. cit., 1867, p. 175. United States, east of the plains; Nova Scotia.

Amblystoma conspersum, Cope, loc. cit., 1867, 177. Pennsylvania to Georgia.

Amblystoma bicolor, Hallowell; Cope, loc. cit., 178. New Jersey.

Amblystoma tigrinum, Green; Cope, loc. cit., 179. United States, east of the plains.

Amblystoma mavortium, Baird; Cope, loc. cit., 184. United States, in the Central, Sonoran, and Pacific regions.

Amblystoma mavortium, Baird; subspecies *californiense*, Gray; Cope, loc. cit., p. 187. Pacific region.

Amblystoma obscurum, Baird; Cope, loc. cit., p. 192. Iowa.

Amblystoma xiphias, Cope, loc. cit., p. 192. Ohio.

Amblystoma trisruptum, Cope, loc. cit., p. 194. New Mexico.

Amblystoma jeffersonianum, Green, subspecies *jeffersonianum*, Green; Cope, loc. cit., p. 195. Pennsylvania and Ohio, and northward.

Amblystoma jeffersonianum, Green, subspecies *laterale*, Hallowell; Cope, loc. cit., p. 197. Canada and Wisconsin, and northward.

Amblystoma jeffersonianum, Green, subspecies *fuscum*, Hallowell; Cope, loc. cit., 197. Indiana and Virginia.

Amblystoma jeffersonianum, Green, subspecies *platincum*; Cope, loc. cit., p. 198. Ohio.

Amblystoma macrodactylum, Baird; Cope, loc. cit., p. 198. Pacific region.

Amblystoma paroticum, Baird; Cope, loc. cit., p. 200. Vancouver's Island and Washington Territory.

Amblystoma aterrimum, Cope, loc. cit., p. 201. Northern Rocky Mountains.

Amblystoma tenebrosum, Baird and Girard; Cope, loc. cit., p. 202. Pacific region of Oregon and California.

Amblystoma texanum, Matthes; Cope, loc. cit., p. 204. Texas.

Amblystoma cingulatum, Cope, loc. cit., p. 205. South Carolina.

Amblystoma microstomum, Cope, loc. cit., p. 206. Austroriparian and Eastern regions, west of the Alleghany Mountains.

DICAMPTODON, Strauch.

Dicamptodon ensatus, Eschscholz, Zoölogical Atlas, part v, p. 6, pl. xxii. Pacific region.

PLETHODONTIDAE.

BATRACHOSEPS, Bonap.

Batrachoseps attenuatus, Eschscholz, Hallowell, Jour. Acad. Phila., 1858, p. 348. Pacific region.

Batrachoseps nigriventris, Cope, Proceed. Acad. Phila., 1869, p. 98. Fort Tejon, California.

Batrachoseps pacificus, Cope, Proceed. Acad. 1865, p. 195. Santa Barbara, Cal.

HEMIDACTYLIUM, Tschudi.

Hemidactylium scutatum, Schlegel; Duméril et Bibron, Erp. Générale, ix, p. 118–9. Rhode Island to Illinois, and to the Gulf of Mexico.

PLETHODON, Tschudi.?

Plethodon cinereus, Green, subspecies *cinereus*, Green; Cope, Proceed. Acad. Phila., 1869, p. 99. Eastern region.

Plethodon cinereus, Green, subspecies *erythronotus*, Green; Holbrook, N. Am. Herp., v, p. 43. Eastern region.

Plethodon cinereus, Green, subspecies *dorsalis*, Baird, MSS. Louisville, Ky.; Salem, Mass.

Plethodon intermedius, Baird, Proceed. Acad. Phila., 1857, p. 209. Vancouver's Island.

Plethodon glutinosus, Green; Cope, loc. cit., 1869, p. 99. Eastern and Austroriparian regions.

Plethodon oregonensis, Girard; Cope, loc. cit., p. 99. Pacific region.

Plethodon flavipunctatus, Strauch., Mem. Acad. Sci. St. Petersburg, 1871, xvi, 71. ? New Albion, Cal.

Plethodon croceater, Cope, loc. cit., 1857, p. 210. Lower California.

STEREOCHILUS, Cope.

Stereochilus marginatum, Hallowell; Cope, loc. cit., 1869, 101. Georgia.

MANCULUS, Cope.

Manculus remifer, Cope, Report of Peabody Academy, Salem, Mass., 1869, p. 84. Florida.

Manculus quadridigitatus, Holbrook, N. Am. Herp., v, p. 65. North Carolina to Florida.

SPELERPES, Raf.

Spelerpes multiplicatus, Cope, Proceed. Acad. Phila., 1869, p. 106. Arkansas.

Spelerpes bilineatus, Green; Cope, loc. cit., p. 105. Eastern and Austroriparian regions, excepting Texas.

Spelerpes longicaudus, Green; Cope, loc. cit., p. 105. Eastern and Austroriparian regions, except Texas.

Spelerpes guttolineatus, Holbrook; Cope, loc. cit., p. 105. North and South Carolina, Georgia, and Alabama.

Spelerpes ruber, Daudin, subspecies *ruber*, Daudin; Cope, loc. cit., 1869, 105. Eastern and Austroriparian regions.

Spelerpes ruber, subspecies *sticticeps*, Baird, MSS. South Carolina.

Spelerpes ruber, Daudin, subspecies *montanus*, Baird; Jour. Acad. Phila., vol. i, p. 293. Alleghany Mountains, from Pennsylvania to South Carolina.

GYRINOPHILUS, Cope.

Gyrinophilus porphyriticus, Green; Cope, Proceed. Acad. Phila., 1869, p. 108. Alleghany Mountains, from New York to Alabama.

ANAIDES, Baird.

Anaides lugubris, Hallowell; Cope, loc. cit., 1869, p. 109. Entire Pacific region.

Anaides ferreus, Cope, loc. cit., 1869, p. 109. Oregon.

DESMOGNATHIDAE.

DESMOGNATHUS, Baird.

Desmognathus ochrophaea, Cope, Proceed. Acad. Phila., 1869, p. 113. Alleghany Mountains, from New York to Georgia.

Desmognathus fusca, Rafinesque; Cope, loc. cit., 115; subspecies *fusca*, Raf.; Cope, loc. cit., 116. Essex County, Massachusetts, to Biloxi, Mississippi.

Desmognathus fusca, Raf., subspecies *auriculata*, Holbrook; Cope, loc. cit., p. 116. South Carolina to Louisiana.

Desmognathus nigra, Green; Cope, loc. cit., p. 117. Alleghany Mountains, from Pennsylvania southward.

PLEURODELIDAE.

DIEMYCTYLUS, Rafinesque.

Diemyctylus torosus, Eschscholz; Girard, U. S. Expl. Exped., 1858, p. 5. Pacific region.

Diemyctylus miniatus, Raf., subspecies *miniatus*, Raf.; Hallowell, loc. cit.; Holbrook, N. Am. Herp., v, p. 57. Eastern and Austroriparian regions.

Diemyctylus miniatus, Raf., subspecies *viridescens*, Raf.; Holbrook, N. Am. Herp., v, p. 77. Eastern and Austroriparian regions.

ANURA.

BUFONIFORMIA.

BUFONIDAE.

BUFO, Laurenti.

Bufo punctatus, Baird; Girard, U. S. Mex. Bound. Surv., ii, p. 25. Sonoran and Lower Californian regions.

Bufo debilis, Girard; Baird, U. S. Mex. Bound. Surv., ii, p. 26 (*B. insidior*). Sonoran region.

Bufo halophilus, Baird; Girard, U. S. Mex. Bound. Surv., ii, p. 26. Pacific region.

Bufo columbiensis, Baird; Girard, Herpetology U. S. Expl. Exped., 77. Pacific region and Montana.

Bufo alvarius, Girard, U. S. Mex. Bound. Surv., ii, p. 26. Sonoran region.

Bufo microscaphus, Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 301. Sonoran region.

Bufo speciosus, Girard, U. S. Mex. Bound. Surv., ii, p. 26. Lower Rio Grande (Sonoran).

Bufo lentiginosus, Shaw, subspecies *frontosus*, Cope, Proc. Acad. Phila., 1866, p. 301. Sonoran region.

Bufo lentiginosus, subspecies *cognatus*, Say; Holbrook, N. Am. Herp., v, p. 21. Texan district.

Bufo lentiginosus, subspecies *americanus*, LeConte; Holbrook, Girard, U. S. Mex. Bound. Surv., ii, p. 25. Eastern and Austroriparian regions to the plains.

Bufo lentiginosus, subspecies *lentiginosus*, Latr.; Holbrook, N. Am. Herp., v, p. 7. Austroriparian region.

Bufo lentiginosus, subspecies *fowlerii*, Putnam, MSS. Massachusetts to Lake Winnipeg.

Bufo quercicus, Holbrook, N. Am. Herp., v, p. 13; Cope, Proc. Acad. Phila., 1862, p. 341. Floridan and Eastern Lousianian districts to North Carolina.

Bufo valliceps, Wiegmann; Girard, U. S. Mex. Bound. Surv., ii, p. 25, pl. xl, figs. 1–4 (*B. nebulifer*, Girard). Texan district (also Mexico).

FIRMISTERNIA.

ENGYSTOMIDAE.

ENGYSTOMA, Fitzinger.

Engystoma carolinense, Holbrook, N. Am. Herp., v, p. 23. Austroriparian region.

ARCIFERA.

HYLIDAE.

ACRIS, Dum., Bibr.

Acris gryllus, LeConte, subspecies *gryllus*, Holbrook, N. Am. Herp., iv, p. 131. Austroriparian region.

Acris gryllus, LeConte, subspecies *crepitans*, Baird, U. S. Mex. Bound. Surv., ii, p. 28. Eastern and Central regions.

CHOROPHILUS, Baird.

Chorophilus triseriatus, Wied, subspecies *clarkii*, Baird, U. S. Mex. Bound. Surv., p. 28. Texan district.

Chorophilus triseriatus, subspecies *triseriatus*, Wied. Central and Eastern regions.

Chorophilus triseriatus, subspecies *corporalis*, Cope, MSS. New Jersey.

Chorophilus nigritus, LeConte; Holbrook, N. Am. Herp., iv, p. 107. South Carolina and Georgia.

Chorophilus angulatus, Cope (*Cystignathus ocularis*), Holbrook, N. Am. Herp., iv, p. 137. South Carolina.

Chorophilus ocularis, Daudin (*Cystignathus ornatus*), Günther, Cat. Bat. Salien. Brit. Mus., p. 29. South Carolina and Georgia.

Chorophilus ornatus, Holbrook, N. Am. Herp., iv, p. 25. South Carolina; Georgia.

HYLA, Laurenti.

Hyla curta, Cope, Proc. Acad. Phila., 1866, p. 313. Lower Californian region.

Hyla regilla, Baird; Girard, U. S. Expl. Exped., p. 60. Pacific region.

Hyla eximia, Baird, U. S. Mex. Bound. Surv., p. 29. Sonoran region.

Hyla andersonii, Baird; Cope, Proc. Phila. Acad., 1862, 154. New Jersey to South Carolina.

Hyla squirella, Daudin; Holbrook, N. Am. Herp., iv, pl. 30. Austroriparian region.

Hyla carolinensis, Pennant; Holbrook, N. Am. Herp., iv, p. 29. Austroriparian region.

Hyla carolinensis, Penn., subspecies *semifasciata*, Hallowell, Proc. Acad. Phila., 1856, 306. Texan district.

Hyla pickeringii, Holbrook, N. Am. Herp., iv, pl. 34. Eastern region.

Hyla femoralis, Daudin; Holbrook, N. Am. Herp., iv, p. 31. Eastern part of Austroriparian region.

Hyla versicolor, LeConte; Holbrook, N. Am. Herp., iv, p. 28. Eastern and Austroriparian regions.

Hyla arenicolor, Cope; Baird, U. S. Bound. Surv., 29. Sonoran region.

Hyla cadaverina, Cope; Hallowell, U. S. P. R. R. Surv., x, Williamson's Report, 21. Pacific region.

Hyla gratiosa, LeConte, Proc. Acad. Phila., 1856, 146. Florida; Lower Georgia.

SMILISCA, Cope.

Smilisca baudinii, Dum., Bibr.; Baird, U. S. Bound. Surv., p. 29, pl. xxxviii, figs. 1–3. Lower Rio Grande, Mexico.

CYSTIGNATHIDAE.

LITHODYTES, Cope.

Lithodytes ricordii, Dum., Bibr.; Cope, Proc. Acad. Phila., 1862, 153. Southern Florida (Bahamas; Cuba).

EPIRHEXIS, Cope.

Epirhexis longipes, Baird, U. S. Mex. Bound. Surv., pl. xxxvii, figs 1–3. Lower Rio Grande.

SCAPHIOPIDAE.

SPEA, Cope.

Spea bombifrons, Cope, Proc. Acad. Phila., 1863, p. 53. Central region.

Spea hammondii, Baird; Cope, Proc. Acad. Phila., 1863, p. 53. Pacific region to San Diego.

Spea multiplicata, Cope, loc. cit., p. 52. Near city of Mexico.

SCAPHIOPUS, Holbrook.

Scaphiopus varius, Cope, subspecies *varius*, Cope, loc. cit., p. 52. Lower California.

Scaphiopus varius, Cope, subspecies *rectifrenis*, Cope, loc. cit., p. 53. Sonoran region.

Scaphiopus couchii, Baird; Cope, loc. cit., p. 52. Sonoran region.

Scaphiopus holbrookii, Harlan; Cope, loc. cit., p. 54. Eastern and Austroriparian regions.

RANIFORMIA.

RANIDAE.

RANA, Linn.

Rana areolata, Baird and Girard, subspecies *capito*, LeConte, Proc. Acad. Phila., 1855, p. 425. Floridan district.

Rana areolata, Baird and Girard, subspecies *areolata*, Bd. Gir., U. S. Mex. Bound. Surv., 28, pl. xxxvi, figs. 11–12. Texan district.

Rana montezumæ, Baird, U. S. Mex. Bound. Surv., p. 27. Mexican plateau.

Rana halecina, Kalm; Holbrook, N. Am. Herp., iv, p. 91; subspecies *halecina*, Hallowell, Proc. Acad. Phila., 1856, pp. 141, 250. Eastern coast-countries of Eastern and Austroriparian regions.

Rana halecina, Kalm, subspecies *berlandieri*, Baird, U. S. Mex. Bound. Surv., p. 27. Entire Interior of North America; Mexico.

Rana palustris, LeConte; Holbrook, N. Am. Herp., iv, p. 95. Eastern region.

Rana septentrionalis, Baird, Proc. Acad. Phila., 1854, p. 61 (*R. sinuata*, Bd.). Canada to Montana.

Rana clamitans, Merrem.; Holbrook, N. Am. Herp., iv, pp. 85–87. Eastern region, Louisianian district.

Rana catesbiana, Shaw; Holbrook, N. Am. Herp., iv, p. 77. Eastern and Austroriparian regions.

Rana temporaria, Linn., subspecies *aurora*, Bd.; Gird., U. S. Expl. Exped. Herp., p. 18.

Rana temporaria, Linn., subspecies *silvatica*, LeConte; Holbrook, N. Am. Herp., iv, p. 24. Eastern region.

Rana temporaria, Linn., subspecies *cantabrigensis*, Baird, Proc. Acad. Phila., 1854, p. 61. Canadian district of Eastern region to Rocky Mountains.

Rana pretiosa, Baird; Girard, U. S. Expl. Exped. Herp., p. 20. Pacific subregion.

OPHIDIA.

SOLENOGLYPHA.

CROTALIDAE.

APLOASPIS, Cope.

Aploaspis lepida, Kennicott, Proc. Acad. Phila., 1861, p. 206. Western Texas.

CROTALUS, Linn.

Crotalus pyrrhus, Cope, Proc. Phila., 1866, p. 308. Central Arizona.

Crotalus mitchellii, Cope, loc. cit., 1861, p. 293. Lower California.

Crotalus cerastes, Hallowell; Baird, U. S. Mex. Bound. Surv., vol. ii, p. 14. Arizona.

Crotalus tigris, Kennicott, U. S. Mex. Bound. Surv., vol. ii, p. 14. Arizona.

Crotalus enyo, Cope, Proc. Acad. Phila., 1861, p. 293. Lower California.

Crotalus horridus, Linn.; Holbrook, N. Am. Herp., iii, p. 9. Eastern and Austroriparian regions.

Crotalus adamanteus, Beauvois, subspecies *adamanteus*, Beauvois; Baird and Girard, N. Am. Serpents, p. 3. North Carolina to Florida.

Crotalus adamanteus, Beauvois, subspecies *atrox*, Baird and Girard, Cat., p. 5. Indian Territory and Texas to Sonora and Southern and Lower California.

Crotalus adamanteus, Beauvois, subspecies *scutulatus*, Kennicott, Proc. Acad. Phila., 1861, p. 207. Arizona.

Crotalus lucifer, Baird and Girard, Cat., p. 6. Pacific subregion; mountains of Arizona.

Crotalus polystictus, Cope, Proc. Acad. Phila., 1865, p. 191. Table land of Mexico.

Crotalus confluentus, Say; Baird and Girard, loc. cit., p. 8. Central and Sonoran regions, entering Texan district of the Austroriparian.

Crotalus molossus, Baird and Girard, Cat., p. 10. Sonoran region, entering the Texan district.

CAUDISONA, Laurenti.

Caudisona rava, Cope, Proc. Acad. Phila., 1865, p. 191. Table land of Mexico.

Caudisona miliaria, Linn.; Baird and Girard, Cat., p. 11. Austroriparian region and Sonora.

Caudisona edwardsii, Baird and Girard, Cat., p. 15. Sonoran region.

Caudisona tergemina, Say; Baird and Girard, Cat., p. 14. Eastern region west of the Allegheny Mountains; Georgia.

ANCISTRODON, Beauvois.

Ancistrodon piscivorus, Lacépède, subspecies *piscivorus*, Lacépède; Baird and Girard, Cat., 19. Austroriparian region, except Texas.

Ancistrodon piscivorus, Lacépède, subspecies *pugnax*, Baird and Girard, Cat., p. 20. Texan district.

Ancistrodon contortrix, Linn.: Baird and Girard, Cat., p. 17. Entire Eastern and Austroriparian regions.

Ancistrodon atrofuscus, Troost.: Holbrook, N. Am. Herp., iii, p. 43. Mountains of Tennessee and North Carolina.

PROTEROGLYPHA

ELAPIDAE.

ELAPS, Schneider.

Elaps fulvius, Linn., Baird and Girard, Cat., p. 21; subspecies *fulvius*. Austroriparian region.

Elaps fulvius, Linn., subspecies *tener*, Baird and Girard, Cat., p. 22. Texas.

Elaps euryxanthus, Kennicott, Proc. Acad. Phila., 1860, p. 337. Sonoran region.

Elaps distans, Kennicott, loc. cit., p. 338. Alabama: Florida.

ASINEA.

COLUBRIDAE.

CARPHOPHIOPS, Gervais.

Carphophiops [illegible], Kennicott, Proc. Acad. Phila., 1860, p. 180. Southern Illinois: Mississippi.

Carphophiops amoenus, Say; Baird and Girard, Cat., p. 134. Massachusetts to Louisiana and Illinois.

Carphophiops [illegible], Kennicott, Proc. Acad. Phila., 1860, p. 99. Missouri: Kansas.

VIRGINIA, Baird and Girard.

Virginia harperti, Dum., Bibr., Erpétologie Générale, vol. vi, p. 135. Texas; ?Georgia.

Virginia valeriae, Baird and Girard, Cat., p. 127. Maryland to Illinois and North Carolina.

Virginia elegans, Kennicott, Proc. Acad. Phila., 1859, p. 99. Southern Illinois; Arkansas.

HALDEA, Baird and Girard.

Haldea striatula, Linn.; Baird and Girard, Cat., p. 122. Virginia to Texas.

TANTILLA, Baird and Girard.

Tantilla planiceps, Blainville; Baird and Girard, Cat., p. 154. Lower California.

Tantilla gracilis, Baird and Girard, Cat., p. 132. Texas.

Tantilla hallowellii, Cope, Proc. Acad. Phila., 1861, p. 7. Texas.

Tantilla nigriceps, Kennicott, Proc. Acad. Phila., 1860, 328. Texas; New Mexico; Arizona.

Tantilla coronata, Baird and Girard, Cat., p. 131. Georgia; Mississippi.

ABASTOR, Gray.

Abastor erythrogrammus, Dandin; Baird and Girard, Cat., 125. North Carolina to Alabama.

FARANCIA, Gray.

Farancia abacura, Holbrook; Baird and Girard, Cat., p. 123. Austro-riparian region.

CHILOMENISCUS, Cope.

Chilomeniscus stramineus, Cope, Proc. Acad. Phila., 1860, p. 339. Lower California.

Chilomeniscus ephippicus, Cope, Proc. Acad. Phila., 1867, p. 85. Owen Valley, California (Sonoran subregion).

Chilomeniscus cinctus, Cope, Proc. Acad. Phila., 1861, p. 303. Sonora.

CHIONACTIS, Cope.

Chionactis occipitalis, Hallowell, U. S. Pacific R. R. Survey, vol. x, Williamson's Report, p. 15. Fort Mojave, Arizona.

Chionactis occipitalis, Hallowell, subspecies *annulata*, Kennicott, U. S. Mex. Bound. Surv., vol. ii, p. 22. Colorado Desert, Arizona.

CONTIA, Baird and Girard.

Contia mitis, Baird and Girard, Cat., p. 110. Pacific region.

Contia isozona, Cope, Proc. Acad. Phila., 1866, p. 304. Utah; Arizona.

Contia episcopa, Kennicott, U. S. Mex. Bound. Surv., ii, p. 22. Texas.

Contia pygaea, Cope, Proc. Acad. Phila., 1871, p. 222. Florida.

SONORA, Baird and Girard.

Sonora semiannulata, Baird and Girard, Cat., p. 117. Sonora.

LODIA, Baird and Girard.

Lodia tenuis, Baird and Girard, Cat., p. 116. Washington Territory.

GYALOPIUM, Cope.

Gyalopium canum, Cope, Proc. Acad. Phila., 1860, 243. Arizona.

CEMOPHORA, Cope.

Cemophora coccinea, Blumenbach, Baird and Girard, Cat., p. 118. Austroriparian region.

RHINOCHILUS, Baird and Girard.

Rhinochilus lecontei, Baird and Girard, Cat., p. 120. Sonoran and Southern Pacific regions.

OSCEOLA, Baird and Girard.

Osceola elapsoidea, Holbrook; Baird and Girard, Cat., p. 133. Virginia to Florida.

OPHIBOLUS, Baird and Girard.

Ophibolus doliatus, Linn., subspecies *coccineus*, Schlegel; Baird and Girard, Cat., p. 89. Florida to New Mexico; Kansas.

Ophibolus doliatus, Linn., subspecies *amaurus*, Cope, Proc. Acad. Phila., 1860, p. 258.

Ophibolus doliatus, Linn., subspecies *gentilis*, Baird and Girard, Cat., p. 90. Arkansas.

Ophibolus doliatus, Linn., subspecies *annulatus*, Kennicott, Proc. Acad. Phila., 1860, p. 329. Kansas; Arkansas and Texas.

Ophibolus doliatus, Linn., subspecies *doliatus*, Linn.; Cope, Proc. Acad., 1860, p. 256. Maryland and Virginia to Kansas; Arkansas, Louisiana, and Texas.

Ophibolus doliatus, Linn., var. *triangulus*, Boie; Baird and Girard, Cat., p. 87. From Virginia northward to Canada, Iowa, and Wisconsin.

Ophibolus multistratus, Kennicott, Proc. Acad. Phila., 1860, p. 328. Nebraska.

Ophibolus pyrrhomelas, Cope, Proc. Acad. Phila., 1866, p. 305. Arizona and California.

Ophibolus getulus, Linn., subspecies *boylii*, Baird and Girard, Cat., p. 82. Pacific and Sonoran regions.

Ophibolus getulus, Linn., subspecies *conjunctus*, Cope, Proc. Acad. Phila., 1861, 301. Lower California.

Ophibolus getulus, Linn., subspecies *splendidus*, Baird and Girard, Cat., p. 83. Sonoran region.

Ophibolus getulus, var. *sayi*, Holbrook; Baird and Girard, Cat., p. 84. United States, between the Allegheny and Rocky Mountains, from the Gulf of Mexico to Illinois.

Ophibolus getulus, Linn.; subspecies *getulus*, Linn.; Baird and Girard, Cat., p. 85. From Maryland to Florida and Louisiana, east of the Alleghenies.

Ophibolus californiae, Blainv.; Baird and Girard, Cat., p. 153. Lower California.

Ophibolus rhombomaculatus, Holbrook; Baird and Girard, Cat., p. 86. North Carolina to Georgia.

Ophibolus calligaster, Say; Cope, Proc. Acad. Phila., 1860, p. 255. Illinois to Kansas and Arkansas.

DIADOPHIS, Baird and Girard.

Diadophis punctatus, Linn., subspecies *punctatus*, Linn.; Baird and Girard, Cat., p. 112. United States and Canada, east of the plains and Texas.

Diadophis punctatus, Linn., subspecies *stictogenys*, Cope, Proc. Acad. Phila., 1860, p. 250. Texas.

Diadophis punctatus, Linn., subspecies *amabilis*, Baird and Girard, Cat., p. 113. Pacific and Sonoran regions; occasional in Texan district and Central and Eastern regions as far as Ohio.

Diadophis dysopes, Cope, Proc. Acad., 1860, p. 251. Habitat unknown.

Diadophis arnyi, Kennicott, Proc. Acad., 1859, p. 99. Illinois and Kansas.

Diadophis regalis, Baird and Girard, Cat., p. 115. Arizona; Sonora.

CONIOPHANES, Hallowell.

Coniophanes imperialis, Girard, U. S. Mex. Bound. Surv., vol. ii, p. 23. Chihuahua.

HYPSIGLENA, Cope.

Hypsiglena ochrorhyncha, Cope, Proc. Acad., 1860, 246. Lower California north to San Diego.

Hypsiglena ochrorhyncha, Cope, subspecies *chlorophaea*, Cope, loc. cit., 1860, p. 247. Arizona.

SIBON, Fitzinger.

Sibon annulatum, Linn., subspecies *septentrionale*, Kennicott, U. S. Mex. Bound. Surv., vol. ii, p. 16. Southwestern Texas.

TRIMORPHODON, Cope.

Trimorphodon lyrophanes, Cope, Proc. Acad. Phila., 1860, p. 343. Lower California and Arizona.

PHIMOTHYRA, Cope.

Phimothyra grahamiae, Baird and Girard, Cat., p. 104. Lower California and Sonoran regions to Utah and Texas.

Phimothyra grahamiae, Baird and Girard, subspecies *hexalepis*, Cope, Proc. Acad. Phila., 1866, p. 304.

Phimothyra decurtata, Cope, Proc. Acad., 1868, p. 310. Lower California.

DROMICUS, Bibron.

Dromicus flavilatus, Cope, Proc. Acad. Phila., 1871, p. 223. Coast of North Carolina.

CYCLOPHIS, Günther.

Cyclophis vernalis, DeKay; Baird and Girard, Cat., p. 108. Eastern and Austroriparian regions; rare in the latter.

Cyclophis aestivus, Linn.; Baird and Girard, Cat., p. 106. Austroriparian region, and the Eastern as far as New Jersey, Maryland, and Southern Illinois.

COLUBER, Linn.

Coluber emoryi, Baird and Girard, Cat., p. 157. Texas and the Mississippi Valley to Kansas and Illinois (*C. calligaster*, Kenn.; *C. rhinomegas*, Cope).

Coluber lindheimerii, Baird and Girard, Cat., p. 74. Texas and Arkansas.

Coluber vulpinus, Baird and Girard, Cat., p. 75. Massachusetts to Michigan, Kansas and northward (*C. spiloides*, D. & B.).

Coluber quadrivittatus, Holbrook; Baird and Girard, Cat., p. 80. North Carolina to Florida.

Coluber obsoletus, Say, Kennicott, Proc. Acad. Phila., 1860, p. 330; subspecies *obsoletus*, Say; Baird and Girard, Cat., p. 73. Entire Eastern United States, from Middle Texas to Massachusetts.

Coluber obsoletus, Say, subspecies *confinis*, Baird and Girard, Cat., p. 76 (*C. rubriceps*, D. & B.). Austroriparian region; Western Missouri.

Coluber guttatus, Linn.; Baird and Girard, Cat., p. 78. Austroriparian region to Central Virginia.

SPILOTES, Wagler.

Spilotes couperii, Holbrook; Baird and Girard, Cat., p. 92. Georgia.

Spilotes erebennus, Cope; Baird and Girard, Cat., p. 158. Texas to Alabama (*Georgia obsoleta*, B. & G.).

PITYOPHIS, Holbrook.

Pityophis melanoleucus, Daudin; Baird and Girard, Cat., p. 65. New Jersey to South Carolina and Ohio.

Pityophis sayi, Schlegel, subspecies *sayi*, Schlegel; Baird and Girard, Cat., p. 151. Illinois to Kansas and northward.

Pityophis sayi, Schlegel, var. *mexicanus*, Duméril et Bibron, Erp. Gén., vol. vii, p. 236. Sonoran and Central regions, entering the Texan district.

Pityophis sayi, Schlegel, var. *bellona*, Baird and Girard, Cat., p. 66. Sonoran and Pacific regions, with Nevada and Utah.

Pityophis catenifer, Blainville; Baird and Girard, Cat., p. 69. Pacific region.

Pityophis vertebralis, Blainville; Cope, Proc. Acad. Phila., 1860, p. 342 (*P. haematois*, Cope). Lower California.

Pityophis elegans, Kennicott, U. S. Mex. Bound. Surv., p. 18. Sonoran region.

BASCANIUM, Baird and Girard.

Bascanium constrictor, Linn.; Baird and Girard, Cat., p. 93. Central, Austroriparian, and Eastern regions.

Bascanium constrictor, Linn., subspecies *vetustum*, Baird and Girard, Cat., p. 97. Pacific region.

Bascanium anthicum, Cope, Proc. Acad. Phila., 1862, p. 238. Louisiana (?).

Bascanium flagelliforme, Catesb., subspecies *flagelliforme*, Baird and Girard, Cat., p. 98. South Carolina to Florida.

Bascanium flagelliforme, Catesb., subspecies *piceum*, Cope, MS. Camp Grant, Arizona.

Bascanium flagelliforme, Catesb., subspecies *testaceum*, Say; Baird and Girard, Cat., pp. 99 and 150. Lower Californian and Sonoran regions, with Nevada, Utah, and Texas.

Bascanium taeniatum, Hallowell, subspecies *laterale*, Hallowell, Proc. Acad. Phila., 1853. Sonoran and Pacific regions.

Bascanium taeniatum, Hallowell, subspecies *taeniatum*, Hallowell; Baird and Girard, Cat., pp. 103 and 160. Pacific and Sonoran regions; Utah and Nevada.

Bascanium taeniatum, Hallowell, subspecies *ornatum*, Baird and Girard, Cat., p. 102. Western Texas.

Bascanium aurigulum, Cope, Proc. Acad. Phila., 1861, p. 301. Lower California.

CHILOPOMA, Cope.

Chilopoma rufopunctatum, Cope, Report on Reptiles of Wheeler's Survey west of one hundredth meridian, 1875 (MS.). Sonoran district.

EUTAENIA, Baird and Girard.

Eutaenia saurita, Linn.; Baird and Girard, Cat., p. 24. Austroriparian and Eastern regions.

Eutaenia sackenii, Kennicott, Proc. Acad. Phila., 1859, p. 99. Floridan district.

Eutaenia faireyi, Baird and Girard, Cat., p. 25. Mississippi Valley, from Louisiana to Wisconsin.

Eutaenia proxima, Say; Baird and Girard, Cat., p. 25. Valley of the Mississippi, from Wisconsin to Louisiana; Texas; Northeastern Mexico.

Eutaenia radix, Baird and Girard, Cat., p. 34. Central region to Lake Michigan; Oregon.

Eutaenia macrostemma, Kennicott, subspecies *megalops*, Kennicott, Proc. Acad. Phila., 1860, p. 330. Sonoran region.

Eutaenia hammondii, Kennicott, Proc. Acad. Phila., 1860, p. 332. Pacific region.

Eutaenia marciana, Baird and Girard, Cat., p. 36. Arkansas, Texas, and entire Rio Grande Valley.

Eutaenia vagrans, Baird and Girard, subspecies *vagrans*, Baird and Girard, Cat., p. 35. Central, Pacific, and northern parts of Sonoran regions.

Eutaenia vagrans, Baird and Girard, subspecies *angustirostris*, Kennicott, Proc. Acad. Phila., 1860, p. 332. Southern Sonoran region.

Eutaenia elegans, Baird and Girard, Cat., p. 34. California.

Eutaenia cyrtopsis, Kennicott, Proc. Acad. Phila., 1860, p. 333. Lower Californian and Sonoran regions.

Eutaenia ornata, Baird, U. S. Mex. Bound. Surv., p. 16. Valley of the Rio Grande del Norte.

Eutaenia sirtalis, Linn., subspecies *dorsalis*, Baird and Girard, Cat., p. 31. Entire North America.

Eutaenia sirtalis, Linn., subspecies *ordinata*, Linn.; Baird and Girard, Cat., p. 32. Northern part of Eastern region; Nova Scotia; North Alabama.

Eutaenia sirtalis, Linn., subspecies *sirtalis*, Linn.; Baird and Girard, Cat., p. 30. North America, excepting the Sonoran, Lower Californian, and southern half of Pacific regions.

Eutaenia sirtalis, Linn., subspecies *parietalis*, Say, Long's Exped. Rocky Mts., i, p. 186. Central and Pacific regions; Illinois.

Eutaenia sirtalis, Linn., subspecies *obscura*, Cope, MS. Eastern subregion north of Washington; northern part of Pacific region.

Eutaenia sirtalis, Linn., subspecies *dorsalis*, Baird and Girard, Cat., p. 31. North America, except the Sonoran and Lower Californian regions.

Eutaenia sirtalis, Baird and Girard, subspecies *pickeringii*, Baird and Girard, Cat., p. 29. Pacific region; Minnesota; Texas.

Eutaenia sirtalis, Linn., subspecies *tetrataenia*, Cope, MS. Pitt River, California.

Eutaenia atrata, Kennicott, Cooper and Suckley's Zoöl. Wash. Terr., p. 296. California.

Eutaenia cooperii, Kennicott, in Cooper and Suckley's Nat. Hist. Wash. Terr., p. 296. Washington and Oregon.

STORERIA, Baird and Girard.

Storeria occipitomaculata, Storer; Baird and Girard, Cat., p. 137. Eastern region; South Carolina; Georgia.

Storeria dekayi, Holbrook; Baird and Girard, Cat., p. 135. Central, Austroriparian, and Eastern regions.

TROPIDOCLONIUM, Cope.

Tropidoclonium storerioïdes, Cope, Proc. Acad. Phila., 1865, p. 190. Plateau of Mexico.

Tropidoclonium lineatum, Hallowell, Proc. Acad. Phila., 1856. Kansas to Texas.

Tropidoclonium kirtlandii, Kennicott, Proc. Acad. Phila., 1856, p. 95. Illinois; Ohio.

TROPIDONOTUS, Kuhl.

Tropidonotus clarkii, Baird and Girard, Cat., p. 48. Texas.

Tropidonotus grahamii, Baird and Girard, Cat., p. 47. The Mississippi Valley, from Louisiana to Wisconsin; Michigan.

Tropidonotus leberis, Linn.; Baird and Girard, Cat., p. 45. Austroriparian and Eastern regions, including Texas.

Tropidonotus rigidus, Say; Baird and Girard, Cat., p. 46. Pennsylvania to Georgia, east of the Allegheny Mountains.

Tropidonotus validus, Kennicott, subspecies *validus*, Kennicott, Proc. Acad. Phila., 1860, p. 334. Lower Californian and Sonoran regions; Utah.

Tropidonotus validus, Kennicott, subspecies *celaeno*, Cope, Proc. Acad. Phila., p. 341. Lower California.

Tropidonotus compsolaemus, Cope, Proc. Acad. Phila., 1860, p. 368. Florida.

Tropidonotus compressicaudus, Kennicott, Proc. Acad. Phila., 1860, p. 335. Florida.

Tropidonotus ustus, Cope, Proc. Acad. Phila, 1860, p. 340. Florida.

Tropidonotus fasciatus, Linn.; Baird and Girard, Cat., p. 39. Austroriparian region.

Tropidonotus sipedon, Linn., subspecies *sipedon*, Linn.; Baird and Girard, Cat., p. 38. Eastern and Austroriparian regions, excepting Texas.

Tropidonotus sipedon, Linn., subspecies *woodhousei*. Baird and Girard, Cat., p. 42. Texas to Missouri.

Tropidonotus sipedon, Linn., subspecies *couchii*, Kennicott, Proc. Acad., 1860, p. 335. Sonoran region.

Tropidonotus sipedon, Linn., subspecies *erythrogaster*, Shaw; Baird and Girard, Cat., p. 40. Austroriparian region, except Texas; Michigan and Kansas.

Tropidonotus taxispilotus, Holbrook; Baird and Girard, Cat., p. 43. North Carolina to Georgia.

Tropidonotus rhombifer, Hallowell; Baird and Girard, Cat., p. 43. Louisiana to Illinois and Michigan.

Tropidonotus cyclopium, Dum. et Bibron; Cope, Proc. Acad., 1861, p. 299. Florida.

HELICOPS, Wagler.

Helicops allenii, Garman, Proc. Bost. Soc. Nat. Hist., 1874, p. 92. Floridan district.

HETERODON, Beauv.

Heterodon platyrhinus, Latreille; Baird and Girard, Cat., p. 51. Entire Austroriparian and Eastern regions.

Heterodon platyrhinus, Latr., subspecies *atmodes*, Baird and Girard, Cat., p. 57. North Carolina to Georgia.

Heterodon simus, Linn., subspecies *simus*, Baird and Girard, Cat., p. 59. Austroriparian region, excepting Texas.

Heterodon simus, Linn., subspecies *nasicus*, Baird and Girard, Cat., p. 61. Sonoran and Central regions and Texas.

BOIDAE.

CHARINA, Gray.

Charina bottae, Blainv., Nouvelles Annales Mus. Hist. Nat., iii, 1834, 57. Lower Californian region.

Charina plumbea, Baird and Girard, Cat., p. 139. Pacific region; ? Nevada.

LICHANURIDAE.

LICHANURA, Cope.

Lichanura trivirgata, Cope, Proc. Acad. Phila., 1861, p. 304. Lower California.

Lichanura myriolepis, Cope, Proc. Acad. Phila., 1868, p. 2. Lower California.

Lichanura roseifusca, Cope, Proc. Acad. Phila., 1868, p. 2. Lower California.

SCOLECOPHIDIA.

STENOSTOMIDAE.

STENOSTOMA, Wagl.

Stenostoma dulce, Baird and Girard, Cat., p. 142. Sonoran region; Texas.

Stenostoma humile, Baird and Girard, Cat., p. 143. Pacific region.

LACERTILIA.

OPHEOSAURI.

AMPHISBAENIDAE.

RHINEÜRA, Cope.

Rhineüra floridana, Baird; Cope, Proc. Acad. Phila., 1861, p. 75. Floridan district.

PLEURODONTA.

TYPHLOPHTHALMI.

ANIELLIDAE.

ANIELLA, Gray.

Aniella pulchra, Gray. Pacific region, from San Francisco southward.

LEPTOGLOSSA.

SCINCIDAE.

OLIGOSOMA, Girard.

Oligosoma laterale, Say; Holbrook, N. Am. Herp., ii, p. 133. Austro-riparian region; Northwest South Carolina.

EUMECES, Wiegmann.

Eumeces septentrionalis, Baird, Proc. Acad. Phila., 1858, p. 256. Minnesota and Nebraska.

Eumeces egregius, Baird, Proc. Acad. Phila., p. 256. Florida.

Eumeces onocrepis, Cope, Report of Peabody Academy, Salem., 1869, p. 82. Florida.

Eumeces tetragrammus, Baird, Proc. Acad. Phila., 1858, 256. Lower Rio Grande.

Eumeces anthracinus, Baird, Jour. Acad. Phila., i, p. 293. Pennsylvania to Texas, in mountains.

Eumeces inornatus, Baird, Proc. Acad. Phila., 1856, p. 256. Nebraska.

Eumeces multivirgatus, Hallowell, Proc. Acad. Phila., 1857, p. 215. Central region.

Eumeces leptogrammus, Baird, Proc. Acad. Phila., 1858, p. 256. Central region.

Eumeces obsoletus, Baird and Girard, Proc. Acad. Phila., 1852, p. 129. Sonoran region, and borders of Central and Austroriparian.

Eumeces guttulatus, Hallowell; Sitgreaves's Report on Zuni, p. 113. Sonoran region and Western Texas.

Eumeces skiltonianus, Baird and Girard; Baird in Stansbury's Report Salt Lake, p. 349. Pacific region.

Eumeces fasciatus, Linn.; Holbrook, N. Am. Herp., ii, p. 117, and pp. 121, 127. Central, Austroriparian, and Eastern regions.

Eumeces longirostris, Cope, Proc. Acad. Phila., 1861, p. 313. Bermuda Islands.

LACERTIDAE.

XANTUSIA, Baird.

Xantusia vigilis, Baird, Proc. Acad. Phila., 1856, p. 255. Pacific subregion.

TEIDAE.

CNEMIDOPHORUS, Wiegmann.

Cnemidophorus maximus, Cope, Proc. Acad. Phila., 1863, p. 104. Lower California.

Cnemidophorus grahamii, Baird and Girard, Proc. Acad. Phila., 1852, p. 128. Eastern Sonoran region.

Cnemidophorus sexlineatus, Linn.; Holbrook, N. Am. Herp., ii, p. 109. Sonoran and Austroriparian regions, to Southeast Virginia.

Cnemidophorus inornatus, Baird, Proc. Acad. Phila., 1858, p. 255. Southern Sonoran region.

Cnemidophorus octolineatus, Baird, Proc. Acad. Phila., 1858, p. 255. Southern Sonoran region.

Cnemidophorus perplexus, Baird and Girard, Proc. Acad. Phila., 1852, p. 128. Rio Grande Valley.

Cnemidophorus tessellatus, Say, subspecies *tessellatus*, Say; Baird, U. S. P. R. R. Surv., x, Beckwith's Report, p. 18. Southern Colorado.

Cnemidophorus tessellatus, Say, subspecies *tigris*, Baird and Girard; Stansbury's Report Salt Lake, p. 338. Pacific and Sonoran regions to Utah.

Cnemidophorus tessellatus, Say, subspecies *melanostethus*, Cope, Proc. Acad. Phila., 1863, p. 104. Southeast Arizona.

Cnemidophorus tessellatus, Say, subspecies *gracilis*, Baird and Girard, Proc. Acad. Nat. Sci. Phila., 1852, 128. Southeast Arizona.

VERTICARIA, Cope.

Verticaria hyperythra, Cope, Proc. Acad. Phila., 1863, p. 103. Lower California to San Diego.

DIPLOGLOSSA.

ANGUIDAE.

OPHEOSAURUS, Daudin.

Opheosaurus ventralis, Daudin; Holbrook, N. Am. Herp., ii, p. 139. Austroriparian region; Tennessee; Kansas.

GERRHONOTIDAE.

BARISSIA, Gray.

Barissia olivacea, Baird, Proc. Acad. Phila., 1858, p. 255. Southern California.

GERRHONOTUS, Wiegmann.

Gerrhonotus nobilis, Baird and Girard, Proc. Acad. Phila., 1852, p. 129. Sonora.

Gerrhonotus principis, Baird and Girard, Proc. Acad. Phila., 1852, p. 175. Northern Pacific region.

Gerrhonotus multicarinatus, Blainville (*G. formosus*), Baird and Girard, Proc. Acad. Phila., 1852, p. 175. Pacific and Lower Californian regions.

Gerrhonotus grandis, Baird and Girard, Proc. Acad. Phila., 1852, p. 176. Pacific region.

Gerrhonotus scincicaudus, Skilton, Am. Jour. Sci. Arts, 1849, p. 202. Pacific and Lower Californian regions.

Gerrhonotus infernalis, Baird and Girard; Cope, Proc. Acad. Phila., 1866, 322. Western Texas.

HELODERMIDAE.

HELODERMA, Wiegmann.

Heloderma suspectum, Cope; Baird, U. S. Bound. Surv., plate xxvi. Sonoran region.

IGUANIA.

IGUANIDAE.

HOLBROOKIA, Girard.

Holbrookia maculata, Girard, subspecies *maculata*, Girard; Stansbury's Report, 1852, p. 342. Central and Sonoran subregions.

Holbrookia maculata, Girard, subspecies *propinqua*, Baird and Girard, Proc. Acad. Phila. 1852, p. 126. Texas.

Holbrookia texana, Troschel; Baird and Girard, Proc. Acad. Phila., 1852, p. 125. Sonoran region; Western Texas.

CALLISAURUS, Blainville.

Callisaurus dracontoides, Blainv., subspecies *ventralis*, Hallowell; Sitgreave's Report Zuñi, p. 117. Sonoran region.

Callisaurus dracontoides, Blainv., subspecies *gabbii*, Cope, MS. Northern Lower California.

Callisaurus dracontoides, Blainv., subspecies *dracontoides*, Blainv., Nouv. Ann. de Mus., p. 426. Southern Lower California.

UMA, Baird.

Uma notata, Baird, Proc. Acad. Phila., 1858, p. 253. Sonora region.

SAUROMALUS, Duméril.

Sauromalus ater, Duméril; Baird, U. S. and Mex. Bound. Surv., p. 6. Sonoran region.

CROTAPHYTUS, Holbrook.

Crotaphytus collaris, Say; Holbrook, N. Am. Herp., ii, p. 79. Sonoran region; Central region to latitude 40°.

Crotaphytus wislizenii, Baird and Girard, Stansbury's Report Salt Lake, p. 340. Pacific and Sonoran regions; Nevada, Utah.

Crotaphytus reticulatus, Baird, Proc. Acad. Phila., 1858, p. 253. Western Texas.

DIPSOSAURUS, Hallowell.

Dipsosaurus dorsalis, Baird and Girard, Proc. Acad. Phila., 1852, p. 126. Lower Californian, Southern Pacific, and Sonoran regions.

UTA, Baird and Girard.

Uta thqlassina, Cope, Proc. Acad. Phila., 1863, p. 104. Lower California.

Uta graciosa, Hallowell, Proc. Acad. Phila., 1854, p. 92. Pacific region.

Uta nigricauda, Cope, Proc. Acad. Phila., 1864, p. 176. Lower California.

Uta schottii, Baird, Proc. Acad. Phila., 1858, p. 253. Southern California.

Uta ornata, Baird and Girard, Proc. Acad. Phila., 1852, p. 126. Sonoran region.

Uta stansburiana, Baird and Girard, Stansbury's Report Salt Lake, p. 345. Pacific, Lower Californian, and Sonoran regions; Nevada, Utah.

SCELOPORUS, Wiegmann.

Sceloporus ornatus, Baird, U. S. Mex. Bound. Surv., p. 5. Southeastern Sonoran region.

Sceloporus jarrovii, Cope, MS., Zoöl. Wheeler's Expl. west of the 100th merid., 1875. Sonoran region (Southern Arizona).

Sceloporus poinsettii, Baird and Girard, Proc. Acad. Phila., 1852, p. 126. Sonoran region.

Sceloporus torquatus, Peale and Green, Proc. Acad. Phila., ii, p. 131. Southern Sonoran region.

Sceloporus couchii, Baird, Proc. Acad. Phila., 1858, p. 254. Southern Sonoran region.

Sceloporus marmoratus, Hallowell, Proc. Acad. Phila., 1852, p. 178. Sonoran region; Utah.

Sceloporus biseriatus, Hallowell, U. S. P. R. R. Surv., x, Williamson's Report, p. 6. ?Habitat.

Sceloporus undulatus, Harlan, subspecies *undulatus*, Harlan; Holbrook, Am. Herp., ii, p. 73. North America, except Sonoran and Lower Californian regions.

Sceloporus undulatus, Harlan, subspecies *thayerii*, Baird and Girard, Proc. Acad. Phila., 1852, p. 127. California, Utah, New Mexico, and Rio Grande Valley.

Sceloporus consobrinus, Baird and Girard; Marcy's Report Red River, 1853, p. 237. Sonoran and Central regions; Oregon and Texas.

Sceloporus scalaris, Wiegmann, Herpetologia Mexicana, 1834, p. 52. Sonora.

Sceloporus floridanus, Baird, Proc. Acad. Phila., 1858, p. 254. Florida.

Sceloporus spinosus, Wiegmann, Herpetologia Mexicana, p. 50. Texas.

Sceloporus clarkii, Baird and Girard, subspecies *clarkii*, Baird and Girard, Proc. Acad. Phila., 1852, p. 127. Sonoran and Southern Pacific regions.

Sceloporus clarkii, Baird and Girard, subspecies *zosteromus*, Cope, Proc. Acad. Phila., 1863, p. 105. Lower California.

PHRYNOSOMA, Wiegmann.

Phrynosoma modestum, Girard, Stansbury's Rept. Salt Lake, p. 365. Sonoran region.

Phrynosoma platyrhinum, Girard, Stansbury's Rept Salt Lake, p. 361. Utah and Nevada.

Phrynosoma maccallii, Hallowell; Baird, U. S. Mex. Bound. Surv., p. 9. Desert of Gila and Colorado.

Phrynosoma regale, Girard, U. S. Mex. Bound. Surv., p. 9. Desert of Gila and Colorado.

Phrynosoma planiceps, Hallowell, Proc. Acad. Phila., 1852, p. 178. Southern Sonoran region.

Phrynosoma cornutum, Harlan; Girard, Stansbury's Rept. Salt Lake, p. 360. Texas.

Phrynosoma hernandezii, Girard, Herp. U. S. Expl. Exped., p. 395. New Mexico; Rio Grande Valley.

Phrynosoma douglassii, Bell, subspecies *ornatissimum*, Girard, Herp. U. S. Expl. Exped., 1858, p. 396. Sonoran region.

Phrynosoma douglassii, Bell, subspecies *douglassii*, Bell; Girard, Herp. U. S. Expl. Exped., p. 398. Entire Central region; Oregon and Washington.

Phrynosoma blainvillei, Gray; Girard, U. S. Expl. Exped. Herp., p. 400. Pacific region.

Phrynosoma coronatum, Blainville, Nouv. Mém. Museum, iv, p. 28. Lower California.

CYCLURA, Harlan.

Cyclura hemilopha, Cope, Proc. Acad. Phila., 1863, p. 105. Lower California.

ANOLIDAE.

ANOLIS, Merrem.

Anolis principalis, Linn.; Holbrook, N. Am. Herp., ii, 67. Austroriparian region.

Anolis cooperii, Baird, Proc. Acad. Phila., 1868, p. 254. ?California.

NYCTISAURA.

GECCONIDAE.

COLEONYX, Gray.

Coleonyx variegatus, Baird, U. S. Mex. Bound. Surv., p. 12. Sonoran region.

SPHAERODACTYLUS, Cuv.

Sphaerodactylus notatus, Baird, U. S. Mex. Bound. Surv., p. 12. Key West, Fla. (Cuba).

PHYLLODACTYLUS, Gray.

Phyllodactylus tuberculosus, Wiegmann, Nova Acta. K. L. C. Acad., xvii, p. 241. Sonoran region.

Phyllodactylus xanti, Cope, Proc. Acad. Phila., p. 102. Lower California.

DIPLODACTYLUS, Gray.

Diplodactylus unctus, Cope, Proc. Acad. Phila., 1863, p. 102. Lower California.

TESTUDINATA.

ATHECAE.

SPHARGIDIDAE.

SPHARGIS, Merrem.

Sphargis coriacea, Rondelet; Holbrook, N. Am. Herp., ii, p. 45. Atlantic coast to Massachusetts.

CRYPTODIRA.

CHELONIIDAE.

THALASSOCHELYS, Fitz.

Thalassochelys caouana, Linn.; Holbrook, N. Am. Herp., ii, p. 33. Entire Atlantic coast.

ERETMOCHELYS, Fitz.

Eretmochelys imbricata, Linn.; Holbrook, N. Am. Herp., ii, p. 39. Southern Atlantic coast.

Eretmochelys squamata, Linn.; Agassiz, Cont. Nat. Hist. U. S., i, p. 382. Pacific coast.

CHELONIA, Brong.

Chelonia mydas, Schw.; Holbrook, N. Am. Herp., ii, p. 25. Atlantic coast south of Long Island.

Chelonia virgata, Schw.; Agassiz, Cont., i, p. 379. Pacific coast.

TRIONYCHIDAE.

AMYDA, Agassiz.

Amyda mutica, Lesueur, Mém. du Mus. d'Hist. Nat., xv, p. 263. Middle and northern tributaries of the Mississippi, and the Saint Lawrence.

ASPIDONECTES, Wagl.

Aspidonectes ferox, Schweigger; Holbrook, N. Am. Herp., ii, p. 11 Georgia to Western Louisiana.

Aspidonectes spinifer, Lesueur, Mém. de Mus. d'Hist. Nat., xv, p. 258. Middle and northern tributaries of the Mississippi, and Saint Lawrence.

Aspidonectes asper, Agassiz, Cont. Nat. Hist. U. S., i, p. 405. Lower Mississippi tributaries.

Aspidonectes nuchalis, Agassiz, Cont. Nat. Hist. U. S., i, p. 406. Cumberland and Upper Tennessee Rivers, Tennessee.

Aspidonectes emoryi, Agassiz, Cont. Nat. Hist. U. S., i, p. 407. Texas.

CHELYDRIDAE.

CHELYDRA, Schw.

Chelydra serpentina, Linn.; Holbrook, N. Am. Herp., i, p. 139. From Canada to Ecuador. Wanting in the Pacific subregion.

MACROCHELYS, Gray.

Macrochelys lacertina, Schweigger; Holbrook, N. Am. Herp., i, p. 147. Tributaries of the Gulf of Mexico, from Florida to Western Texas, extending to Missouri in the Mississippi.

CINOSTERNIDAE.

AROMOCHELYS, Gray.

Aromochelys odoratus, Latreille; Holbrook, N. Am. Herp., i, p. 133. Austroriparian and Eastern subregions.

Aromochelys carinatus, Gray; Agassiz, Cont., i, p. 423. Louisianian district.

CINOSTERNUM, Wagl.

Cinosternum pennsylvanicum, Bosc, subspecies *pennsylvanicum*, Bosc; Holbrook, N. Am. Herp., i, p. 127. Austroriparian (?Texas) and Eastern subregions.

Cinosternum pennsylvanicum, Bosc, subspecies *doubledayi*, Gray, Cat. Tort., Crocod., and Amphisb. B. M., p. 33. Southwestern United States.

Cinosternum sonoriense, LeConte, Proc. Acad. Phila., 1854, p. 183. Arizona.

Cinosternum flavescens, Agassiz, Contrib. Nat. Hist. U. S., i, p. 430. Arizona.

Cinosternum henrici, LeConte, Proc. Acad. Phila., 1854, p. 182. Sonoran subregion.

EMYDIDAE.

PSEUDEMYS, Gray.

Pseudemys rugosa, Shaw; Holbrook, N. Am. Herp., i, p. 55. New Jersey to Virginia.

Pseudemys concinna, LeConte; Holbrook, N. Am. Herp., i, pp. 119, 65. Austroriparian region (?Texas).

Pseudemys mobiliensis, Holbrook, N. Am. Herp., i, p. 71. Florida to the Rio Grande of Texas.

Pseudemys hieroglyphica, Holbrook, N. Am. Herp., i, p. 111. Middle, Western, and Gulf States.

Pseudemys scabra, Linn.; Holbrook, N. Am. Herp., i, p. 49. North Carolina to Georgia.

Pseudemys troostii, Holbrook, N. Am. Herp., i, p. 123. Valley of the Mississippi to Illinois.

Pseudemys elegans, Wied.; Holbrook, N. Am. Herp., i, p. 115. Central region and Texan district.

MALACOCLEMMYS, Gray.

Malacoclemmys geographicus, Lesueur; Holbrook, N. Am. Herp., i, p. 99. Mississippi Valley to Pennsylvania and New York.

Malacoclemmys pseudogeographicus, Holbrook, N. Am. Herp., i, p. 103. Mississippi Valley to Wisconsin and Northern Ohio.

Malacoclemmys palustris, Gmelin; Holbrook, N. Am. Herp., i, p. 87. Coast from New York to Texas.

CHRYSEMYS, Gray.

Chrysemys picta, Herm.; Holbrook, N. Am. Herp., i, p. 75. Eastern region; Louisiana, Mississippi.

Chrysemys oregonensis, Harlan; Holbrook, N. Am. Herp., i, p. 107. Central region.

Chrysemys reticulata, Bosc; Holbrook, N. Am. Herp., i, p. 59. Gulf States.

CHELOPUS, Rafinesque.

Chelopus guttatus, Schneider; Holbrook, N. Am. Herp., i, p. 81. Eastern region east of Ohio.

Chelopus muhlenbergii, Schweigger; Holbrook, N. Am. Herp., vol. i, p. 45. New Jersey and Eastern Pennsylvania.

Chelopus insculptus, LeConte; Holbrook, N. Am. Herp., i, p. 93. Eastern region east of Ohio.

Chelopus marmoratus, Baird and Girard; Hallowell, U. S. P. R. R. Surv., x, Williamson's Report, p. 3. Pacific region.

EMYS, Brong.

Emys meleagris, Shaw; Holbrook, N. Am. Herp., i, p. 39. Alleghenian district of Eastern region to Wisconsin.

CISTUDO, Flem.

Cistudo clausa, Gm., subspecies *clausa*, Gm.; Holbrook, N. Am. Herp., i, p. 31. Eastern region and Louisianian and Floridan districts.

Cistudo clausa, subspecies *triunguis*, Agass., Contrib., i, p. 445. Austro-riparian region to Georgia; Eastern Pennsylvania.

Cistudo ornata, Agass., Contrib., i, p. 445. Central region.

TESTUDINIDAE.

TESTUDO, Linn.

Testudo carolina, Linn.; Holbrook, N. Am. Herp., i, p. 25. Austroriparian region, not north of South Carolina.

Testudo agassizii, Cooper, Proc. Calif. Acad. Sci.* Southern Pacific and Western Sonoran regions.

CROCODILIA.

CROCODILIDAE.

ALLIGATOR, Cuv.

Alligator mississippiensis, Daudin; Holbrook, N. Am. Herp., vol. ii, p. 53. Austroriparian region.

CROCODILUS, Cuv.

Crocodilus americanus, Seba.; Dum. et Bib., Erp. Gén., iii, p. 119. Floridan district.

Enumeration of genera and species.

	Genera.		Species.		
BATRACHIA.					
Trachystomata	2		2		
Proteida	1		2		
Urodela	15		49		
Anura	11		48		
		29			101
REPTILIA.					
OPHIDIA.					
Solenoglypha	4		18		
Proteroglypha	1		3		
Asinea	36		109		
Scolecophidia	1		2		
		42		132	
LACERTILIA.					
Opheosauri	1		1		
Pleurodonta	22		76		
Nyctisaura	3		5		
		26		82	
TESTUDINATA.					
Athecae	1		1		
Cryptodira	16		40		
		17		41	
CROCODILIA	2		2		
					257
Total species					358

* Referred to, vol. for 1870, p. 67.

PART III.

ON GEOGRAPHICAL DISTRIBUTION

OF THE

VERTEBRATA OF THE REGNUM NEARCTICUM,

WITH ESPECIAL REFERENCE TO THE

BATRACHIA AND REPTILIA.

I.—THE FAUNAL REGIONS OF THE EARTH.

As is well known, the life of the different regions of the earth presents marked peculiarities. The differences are, in some measure, connected with the geographical and topographical relations of the continents. To each of them, peculiar divisions of animals are found to be confined; and the sum of these, or the "fauna," is found in each case to present marked characters. The districts thus marked out are the *Australian* (which includes Australia, Van Diemen's Land, New Guinea, etc.); the *Neotropical*, including South America, the West Indies, and Mexico; the *Nearctic*, or North America; the *Ethiopian*, or Africa south of the Desert of Sahara; the *Palaeotropical*, which embraces India and the adjacent islands; and, lastly, the *Palaearctic*, or Asia north of the Himalaya, Europe, and Africa north of the Great Desert. These six districts are variously related by common forms, as well as distinguished by different ones. The name of "realms" has been given to them.

The Australian realm is peculiar in the absence of nearly all types of mammalia, except the *Ornithodelphia* and the Marsupials; in the presence of various Struthious birds; in great development of the *Elapid* serpents, and absence of the higher division of both snakes and frogs (*i. e.*, *Solenoglypha* and *Raniformia*); in the existence of *Dipnoi* (*Ceratodus*) and certain Characinid fishes. On the other hand, many of the lizards and birds are of the higher types that prevail in India and Africa, viz, the *Acrodonta* and the *Oscines*.

The polar hemispheres each possess certain common forms which are not found in the other. Thus, in the southern, which is here understood as embracing the three realms called Australian, Neotropical, and

Ethiopian,* the *Sirenian* mammalia; *Struthious* birds; *Elapid* and *Peropodous* snakes; *Dipnoan*, *Chromid*, and *Characin* fishes; and *Pleurodire* tortoises, are universal, and not, or very sparsely, found in the northern. Of other groups peculiar to the Southern or Equatorial regions, the *Edentate* mammalia belong to the Neotropical and Ethiopian; the *Osteoglossid* fishes to the Neotropical, Palaeotropical, and Australian; while monkeys occur in the southern faunae, except the Australian, and in the Palaeotropical. The Ethiopian shares many peculiarities with the Northern. Thus, Insectivorous mammals, Viperine snakes, and Raniform frogs, are only found here in the southern hemisphere.

The Neotropical realm only possesses exclusively the Platyrhine monkeys and the great majority of the humming-birds. It shares with other Southern regions the Edentate and Tapiroid mammals; Struthious, Pullastrine, and Clamatorial birds; Elapid snakes; Arciferous frogs; and Characin, Chromid, Osteoglossid, and Dipnoan fishes. It has but few types of the Northern regions; these are numerous pleurodont Lacertilia, the Acrodonts being entirely absent; and a few bears, deer, and Oscine birds.

The Ethiopian realm is that one which combines the prevalent features of the Palaearctic region with the southern-hemisphere types already mentioned, together with some found elsewhere only in the Palaeotropical, and a very few peculiar. The two latter classes not being mentioned elsewhere, they may be here enumerated. This region shares, with the Indian alone, the Catarrhine monkeys, the *Elephantidae Rhinocerotidae*, and Chamaeleons. Its peculiar types are the *Lemuridae*, *Hippopotamidae*, and *Cameleopardalidae*, among mammals, and *Polypteridae* and *Mormyridae* among fishes.

The Northern realms of the earth agree in possessing all the earless seals; but most of its common characters are shared by India and Africa. With these regions they possess most all of the Ruminant and Insectivorous mammals, and all the Raniform frogs. The Palaearctic and Palaeotropical are very much alike, and ought probably to be united. The latter differs in possessing monkeys, elephant, rhinoceros, and tapir, *Elapid* serpents (cobras), and *Osteoglossid* fishes. In other respects, as in mammalia generally, Oscine birds and fresh-water fishes, and reptiles generally, it agrees with Northern Asia and Europe.

The Nearctic or North American realm is that with which we have here to do. It extends from the Arctic regions to a line drawn across Northern Mexico, and includes the peninsula of Lower California. It

* "Eogaea" of Gill, characterized in his article "On the geographical distribution of Fishes", in the "Annals and Magazine of Natural History" (4), xv, 255.

agrees in many points with the northern fauna of the Old World, and has been united with it by some authors; but its peculiar types, and those which it shares with South America, are too numerous for such an arrangement. Its relations are exhibited in the following table:

Agrees with Palaearctic in—	Differs from Palaearctic in—	
	Peculiar forms.	Neotropical forms.
Mammalia in general		Bassaridae.
		Procyonidae.
	Antilocapra	Megadermatidae.
	Mephitis	Dicotyles.
		Didelphys.
Birds except		Cathartidae.
		Tanagridae.
		Icteridae.
		Clamatores in general.
		Trochilidae.
	Meleagridae	Odontophorinae.
		Alligators.
		Amivid and Gerrhonotid lizards.
		Iguanid lizards.
Emyd tortoises	Chelydra	Cinosternidae.
		Solenoglyph and Elapid venomous snakes.
Raniform frogs	Scaphiopodidae	Arcifera.
	Plethodontidae.	
	Amblystomidae.	
Diemyctylus.		
Megalobatrachus	Trachystomata.	
	Necturus.	
	Amphiumidae.	
Percid fishes	Aphredoderidae	Siluridae.
Cottidae.		
Haplomi	Hypsaeidae.	
Accipenseridae.		
Spatulariidae.		
Cyprinidae	Plagopterinae.	
Gasterosteidae.	Catostomidae.	
	Amiidae.	
	Lepidosteidae.	
Petromyzon.		

The special peculiarities of the Nearctic region are then chiefly seen in the Fishes and Batrachia. In Birds and Mammals, its prominent divergences from the northern regions of the Old World are seen in the numerous representatives of forms which are characteristically South

American. Of these, the birds offer many genera peculiar to North America, while the few Mammalia are of Neotropical genera. The greatest resemblance between the North American and Palaearctic region is seen in the Mammalia. Around the Arctic regions as well as further south, several species, both of Mammalia and Birds, are identical.

Among Mollusks there is also much resemblance. *Anodonta*, *Unio*, and *Succinea* are common to both the northern faunae, but have no common species; all three greatly predominate in numbers in North America. The snails of the west coast are very European in character, but there are but few *Pupae* in the Regio Nearctica, and no *Clausiliae*, and *Bulimus* is represented by few species.

II.—NUMBER OF SPECIES.

The numbers of the Vertebrata found in the Nearctic realm are nearly as follows:

MAMMALIA:			
Monotremata		0	
Marsupialia		1	
Edentata		1	
Rodentia		139	
Insectivora		28	
Chiroptera		23	
Cetacea		42	
Sirenia		1	
Hyracoidea		0	
Proboscidea		0	
Perissodactyla		0	
Artiodactyla	*Omnivora*	1	
	Ruminantia	14	
Carnivora	*Pinnipedia*	13	
	Fissipedia	46	
Primates		1	
			310
AVES:			
Passeres	*Oscines*	306	
	Clamatores	33	
Zygodactyli		36	
Syndactyli		20	

AVES—Continued.

Psittaci	1	
Accipitres	61	
Pullastrae	12	
Gallinae	22	
Brevipennes	0	
Grallae	81	
Lamellirostres	49	
Steganopodes	13	
Longipennes	71	
Pygopodes	51	
		756

REPTILIA:

Crocodilia	2	
Testudinata	41	
Lacertilia	82	
Ophidia	132	
		257

BATRACHIA:

Anura	48	
Urodela	49	
Gymnophidia	0	
Proteida	2	
Trachystomata	2	
		101

PISCES:

Percomorphi — *Pharyngognathi*	12	
Labyrinthici	0	
Distegi	178	
Rhegnopteri	2	
Epilasmia	18	
Scyphobranchii	77	
Haplodoci	3	
Anacanthini	36	
Heterosomata	22	
Plectognathi	30	
Pediculati	8	
Hemibranchii	20	
Lophobranchii	7	
Synentognathi	10	
Percesoces	13	

PISCES—Continued.

Haplomi	34	
Isospondyli	70	
Plectospondyli	150	
Scyphophori	0	
Nematognathi	27	
Notacanthi	0	
Glanencheli	0	
Ichthyocephali	0	
Holostomi	0	
Enchelycephali	2	
Colocephali	3	
Halecomorphi	2	
Ginglymodi	15	
Glaniostomi	30	
Selachostomi	1	
Holocephali	2	
Plagiostomi	46	
Dipnoi	0	
		816
DERMOPTERI		8
LEPTOCARDII		1
Total species of Vertebrata		2,249

This number is considerably below the truth, as many of the fishes, both of the ocean and of the fresh waters, remain undescribed.

It is more difficult to state the number of species of the inferior divisions of the animal kingdom. It is asserted that 8,000 species of Coleopterous insects have been discovered in the Nearctic region, and that this is probably about two-thirds of the whole. This would give 12,000 species of this the most numerous order, and the *Lepidoptera*, *Hymenoptera*, and *Diptera* will follow at no great distance. Probably 50,000 is below the mark as an estimate of the number of species of insects of this region. One thousand species are to be added for the remaining *Arthropoda*—say, 200 *Myriopoda*, 400 *Arachnida*, and 400 *Crustacea*. Of worms of land and water there are numerous species, the greater proportion of which are not yet known to science.

The number of the *Mollusca* and *Molluscoida* from the coasts and interior of the North American region is about 1,824, of which only 400 are marine. Of the remainder, 1,034 live in the numerous rivers and lakes,

and 400 are terrestrial and air-breathers. They are distributed among the classes as follows:

CEPHALOPODA		25
PULMONATA		400
PROSOBRANCHIATA	Fresh-water	438
	Marine	297
HETEROPODA		28
OPISTHOBRANCHIATA		53
PTEROPODA		25
SCAPHOPODA		4
LAMELLIBRANCHIATA	Fresh-water	596
	Marine	377

MOLLUSCOIDA.

BRACHIOPODA	10
ASCIDIA	30
BRYOZOA	39

The remaining divisions of the animal kingdom may be estimated to number nearly as follows:

ECHINODERMATA (123).

	East coast.	Interior.	West coast.
HOLOTHURIDA	32	....	4
ECHINOIDEA	50	....	18
CRINOIDEA	2	....	....
ASTEROIDEA	17	....	?

COELENTERATA (144).

MEDUSAE:			
Discophora	80	....	22
Siphonophora	3	....	2
CTENOPHORA	12	....	2
POLYPI	13	....	7
HYDROIDEA	....	3	....

The divisions of *Protozoa* are well represented in our waters, but the numbers of our *Spongiida*, INFUSORIA and RHIZOPODA, have not yet been ascertained.

III.—RELATIONS TO OTHER REALMS.

It has been already remarked that several species of *Vertebrata* are common to our northern regions and Europe, Asia, etc. Thus, the

wolf extends throughout the northern hemisphere; the same may be said of the fox, the ermine, and, perhaps, of the beaver. It is not improbable that our buffalo (*Bos americanus*) is a variety only of the *B. bison* of the Old World, and that the grizzly bear (*Ursus horribilis*) bears the same relation to the European brown bear (*U. arctos*). There are also certain corresponding or representative species; thus, our red fox (*Vulpes fulvus*) is nearly related to the European fox (*V. vulgaris*), and the red squirrel (*sciurus hudsonicus*) to the *S. vulgaris* of Europe. The elk and moose (*Cervus canadensis* and *Alces americanus*) respectively answer to the *C. elaphus* and *Alces europaeus.*

The majority of American deer belong to a peculiar group (*Cariacus*) mainly characteristic of the Nearctic realm; while the species of the orders *Rodentia* and *Insectivora* are mostly of characteristically distinct species or higher groups.

Among birds, similar relations prevail. The singing-birds are the most characteristic of any continent, and here we find in North America the greatest number of species, genera, and families of birds which differ from those of the Old World. Of the latter, true thrushes, swallows, shrikes, and crows occur, but in limited numbers; while the genera of finches are mostly distinct, and the vireos, tanagers, wood-warblers, Icteridae, and mock-thrushes, which form the bulk of our avifauna, do not exist in the Old World. On the other hand, starlings, flycatchers, and warblers are absent from North America.

As we direct our observation to birds of extended flight, as the *Accipitres* and water-birds, cases of identity of species of opposite continents become more frequent. This is mostly confined here, also, to the northern regions. The marsh-hawk (*Circus cyaneus*), peregrine falcon, fish-hawk, and golden eagle are examples among Falconidae. Among owls, the cases are still more numerous; such are *Nyctea nivea*, *Surnia ulula*, *Otus brachyotus*, *Strix flammea.* Some of these present geographical varieties. Corresponding species are common here, *e. g.*, the American—

Haliaëtus leucocephalus to *H. albicilla* of Europe;
Buteo swainsonii to *B. vulgaris;*
Falco sparverius to *F. tinnunculus;*
Falco columbarius to *F. aesalon;*
Bubo virginianus to *B. maximus;*
Otus vilsonianus to *O. vulgaris;*
etc., etc.

The Nearctic realm possesses a peculiar family, the *Cathartidae* (turkey-buzzards), which the Old World lacks, but has no vultures properly so-called.

There are several wading-birds common to the two continents; and cases of identity among the ducks, gulls, and divers are relatively still more numerous. The Gallinae are, on the other hand, entirely distinct, though not without a few corresponding species.

Among lower Vertebrata, specific identity is unknown, except in one frog (*Rana temporaria*) and a few marine fishes, with one of fresh-water, the northern pike (*Esox lucius*). The numerous tortoises of North America remind one especially of Eastern Asia and India, but the western regions of our continent are as deficient in this form of animal life as the corresponding part of the Palaearctic region. *Chelydra* is peculiarly North American, and the *Cinosternidae* are Mexican in character.

The principal Crocodilian is our alligator, which presents only minor differences from the South American caimans. The lizards are all of Neotropical families, except the scines (*Eumeces*), which are found elsewhere chiefly in Africa and Australia. The genera are nearly all peculiar, or extend a short distance into the northern parts of the Neotropical, Mexico, and the West Indies. Some families have, however, a correspondence with those of the Old World, as follows: The Nearctic—

Teiidae to Lacertidae;
Gerrhonotidae to Zonuridae;
Iguanidae to Agamidae.

The *Batrachia* present relations to the Europeo-Asiatic fauna in the species of one genus (*Rana*) of frogs, and one genus (*Notophthalmus*) of salamanders. In other respects, the Nearctic batrachian fauna is highly peculiar. The cosmopolitan genus *Hyla* (tree-frogs) exists in numerous species, several of which are terrestrial. The burrowing-frogs (*Scaphiopidae*) are nearly all peculiar to this fauna. The toads are of a peculiar division of the all but cosmopolitan genus *Bufo*. The salamanders present the greatest peculiarities. The large family of *Plethodontidae* is represented by various forms, mostly terrestrial; while the genera *Desmognathus* and *Amblystoma*, each alone in its family, present curious structural modifications. To the latter belong the Siredons, or larval *Amblystomae*, which reproduce without regard to their metamorphosis, sometimes completing it and sometimes remaining unchanged.

As permanent gill-bearing *Batrachia*, *Necturus* represents the Palaearctic *Proteus*, and Siren is quite peculiar to North America. The *Amphiuma*, or snakelike Batrachia, calls to mind the similar extinct forms of the Coal-Measures; while *Protonopsis* is represented by living species in Eastern Asia, and by a fossil genus in the Miocene of Germany.

The marine fishes embrace some species which range both coasts of the North Atlantic. Such are the salmon, the haddock, the mackerel, etc., which furnish food and occupation for a numerous population on the northeastern coast. Farther south, the mullet (*Mugil albula*) is a valued food-fish, and is caught and packed in great numbers. The fishes of the Pacific coast are mostly distinct from those of the Atlantic, except a few circumpolar forms, as *Gasterosteus aculeatus;* but several (as *Gadus vachna*, Pall.) are found also on the Asiatic coast. On the warmer coasts, a few species are common to both oceans, while others exist which have a great range over several seas, noticeable among which are certain species of *Plectognathi*, particularly of *Diodon*, *Balistes*, etc.

The fresh-water fishes embrace many families characteristic of the northern hemisphere, as the cods (*Gadidae*), *Percidae* or perch, the sculpins (*Cottidae*), pike (*Esocidae*), chubs (*Cyprinidae*), the salmon, and herring, eel, sturgeon, and lamprey families. In the catfishes, the region reminds us of the tropical and southern regions; though it is a singular fact that one of our genera (*Amiurus*) is represented by single species in China.

The suckers (*Catostomidae*) are very abundant and characteristic in all fresh waters; but here, again, a single species (*Carpiodes sinensis*) has been detected in China. This is paralleled by the genus *Polyodon* (paddle-fish), of which one species is found in the Mississippi Valley, and one in the Yang-tse-kiang. The most striking peculiarity of the Nearctic waters is the presence of the family of *Lepidosteidae*, or bony gars, which is represented by two genera and numerous species. No form at all resembling these exists in any other country, excepting again one species in China, and one other which is found in the adjoining Neotropical region. Not less peculiar are the species of dog-fish (*Amia*), type of the order *Halecomorphi*, which have some remote affinities with South American forms.

The relations to the Neotropical realm are in part indicated in the table on page 57. But few species are common to the Nearctic and

Southern Neotropical realms. But one mammal (the cougar, *Felis concolor*), and no reptiles, batrachians, nor fresh-water fishes, extend into Brazil; but a number of birds are permanent residents throughout both realms. These are mostly waders, as follows:

Rallus crepitans.
Limosa fedoa.
Tryngites rufescens.
Actiturus bartramius.
Heteroscelus brevipes.
Symphemia semipalmata.
Ereunetes petrificatus.
Aegialitis vilsonius.
Nycterodius violaceus.

To these must be added the turkey-vulture, *Cathartes aura*. Then certain marine birds and a few fishes extend along the coasts of both regions, but their number is comparatively small.

The number of species of the Nearctic realm which occur in the Mexican region is rather greater. The red lynx and raccoon are examples of mammals, and several species of wood-warblers, vireos, and hawks represent the birds as far south as the Isthmus of Darien. The only reptiles are the snapping-tortoise and the ringed snake *Ophibolus doliatus*; the only batrachian is the *Rana halecina berlandieri*. A few other species, as *Eutaenia sirtalis*, extend for a shorter distance into the same region.

In the higher groups of the genus and family, we have greater community with the Neotropical realm. But few genera of *Batrachia* and *Reptilia* extend to its Brazilian region, but there are a few common genera of *Mammalia* (*Mephitis*, *Procyon*, *Ursus*, *Sciurus*, *Hesperomys*, and *Didelphys*), and a number of birds, especially among the lower orders, and the scansores, syndactyli, and clamatores, particularly the *Tyrannidae*. The number of genera which enter Mexico and Central America is much greater, and I select the following from the mammals, reptiles, and batrachians, as these are incapable of the migrations performed by birds. Cosmopolitan genera and those common to both the American realms are omitted.

MAMMALIA.

Lynx.
Urocyon.
Putorius.
Bassaris.
Geomys.
Thomomys.
Ochetodon.
Arvicola.
Neotoma.
Sigmodon.
Cariacus.
Antilocapra.

REPTILIA.

Crotalus.
Candisona.
Ancistrodon.
Tropidoclonium.
Tropidonotus.
Eutaenia.
Trimorphodon.
Hypsiglena.
Ophibolus.
Phimothyra.
Pityophis.
Coluber.
Tantilla.
Chilomeniscus.
Cinosternum.
Chelydra.
Pseudemys.
Chelopus.
Sceloporus.
Phrynosoma.
Heloderma.
Barissia.
Gerrhonotus.
Oligosoma.
Eumeces.
Cnemidophorus.

BATRACHIA.

Amblystoma.
Spelerpes.
Spea.
Rana.

Of fishes, the common genera of the fresh waters are few. They are *Girardinus*, *Gambusia*, *Haplochilus*, and *Fundulus* of Cyprinodontidae, and *Atractosteus* of the bony gars. The southward distribution of the above genera terminates at various points; but those which belong to the Austroriparian region, as distinguished from the Sonoran, are mainly confined to the Mexican plateau. The presence of these, together with a number of peculiar forms, indicates another region of the Nearctic, which is in many respects allied to the Austroriparian. This subject will be considered in a subsequent paper.

In comparing the Nearctic realm with the West Indian region of the Neotropical, much less resemblance can be detected, especially in the Reptiles and Batrachia. The only identical species is the *Anolis principalis*, which is common to the Austroriparian region and Cuba, and there are three others of West Indian origin found in the southern part of Florida. The *Anolis* is the only reptilian genus of wide distribution in the Nearctic realm which occurs in the West Indian region. The West Indian genus *Dromicus* is represented by one species, a rare snake from the coast of North Carolina. In Batrachia, there is no community of species and none of genera, excepting in the case of the cosmopolitan genera *Bufo* and *Hyla*.

IV.—THE REGIONS.

We may now consider the variations exhibited by the component parts of the Nearctic fauna. The distribution of types indicates six principal subdivisions, which have been called the Austroriparian, Eastern, Central, Pacific, Sonoran, and Lower Californian. The Austroriparian region extends northward from the Gulf of Mexico to the isothermal of 77° F. It commences near Norfolk, Va., and occupies a belt along the coast, extending inland in North Carolina. It passes south of the Georgia Mountains, and to the northwestward up the Mississippi Valley to the southern part of Illinois. West of the Mississippi, the boundary extends south along the southern boundary of the high lands of Texas, reaching the Gulf at the mouth of the Rio Grande.

The Eastern is the most extended, reaching from the isothermal line of 77° F. north and from the Atlantic Ocean to the elevated plains west of the Mississippi River. Many of its forms extend up the bottoms of the rivers which flow to the eastward through "The Plains." The Central region extends from the limit of the Eastern as far west as the Sierra Nevada, and south on the mountains of Nevada, and along the mountains of New Mexico. The Sonoran includes parts of Nevada, New Mexico, Arizona, and Sonora in Mexico. It does not cross the Sierra Nevada, nor the Mojave desert, nor extend into the peninsula of Lower California. It sends a belt northward on the east side of the Sierra Nevada as far as, including Owen's Valley in Eastern California, latitude 37°, and enters other valleys in Nevada in the same way. It occupies the lower valley of the Rio Grande, and extends into Texas as far as the desert east of the Rio Pecos. It extends southward in Western Mexico as far as Mazatlan. The Lower Californian region occupies the peninsula of that name as far north as near San Diego.

The peculiarities of these regions are well marked. The two regions included in Eastern North America differ from all the others in the abundance of their turtles and the small number of their lizards. Prolific of life, this area is not subdivided by any marked natural barriers. Hence, though its species present great varieties in extent of range, it is not divided into districts which are very sharply defined. The warmer regions are much richer in birds, reptiles, and insects than the cooler; and as we advance northward many species disappear, while a few others are added. The natural division of the eastern part of the continent is then in a measure dependent on the isothermal lines which traverse it. In accordance with this view, the following districts have been proposed, viz: The Carolinian; the Alleghanian; the Canadian; and the Hudsonian.

The *Austroriparian region* includes the Floridan, Louisianian, and Texan districts. It possesses many peculiar genera of reptiles not found elsewhere, while the region north of it possesses none, its genera being distributed over some or all of the remaining regions. The number of peculiar species in all departments of animal life is large. It presents the greatest development of the eastern reptile life. Sixteen genera of Reptiles and eight of Batrachia do not range to the northward, while ninety-nine species are restricted in the same manner. The peculiar genera which occur over most of its area are—

LIZARDS.

Anolis.
Oligosoma.

SNAKES.

Haldea.
Cemophora.
Tantilla.
Spilotes.
Abastor.
Farancia.

TORTOISES.

Macrochelys.

CROCODILES.

Alligator.

BATRACHIA.

Engystoma.
Manculus.
Stereochilus.
Muraenopsis.
Siren.

I have omitted from this list ten genera which are restricted to one or the other of its subdivisions. The *Siren*, the *Cemophora*, the *Anolis* (chameleon), and the *Alligator*, are the most striking of the above characteristic genera. No genus of lizards is peculiar excepting *Anolis* and *Oligosoma*, which have their greatest development in other than the Nearctic continent. Among serpents, a few genera of Neotropical character extend eastward along the region of the Mexican Gulf, as far as the Atlantic coast, which are not found in any of the Northern regions; such are *Spilotes*, *Tantilla* (occurs in Lower California), and *Elaps* (also in the Sonoran). On the other hand, *Celuta*, *Virginia*, *Haldea*, and *Storeria*, embrace small serpents which it shares with the Eastern region.

This region is the headquarters of the Batrachia, especially of the tailed forms. The majority of species of the tailless genera are found here, especially of *Hyla* (tree-toads), *Rana*, and *Chorophilus*.

There are no less than nine genera of birds which do not, or only accidentally, range northward of this district. They are—

Plotus.
Tantalus.
Platalea.
Elanus.
Ictinia.
Conurus.
Chamaepelia.
Campephilus.
Helmitherus.

All these genera, excepting the last, range into South America or farther.

Among mammals, but few species and one genus (*Sigmodon*) are confined to it. *Lepus aquaticus* and *L. palustris*, the cotton-rat, the Florida *Neotoma*, etc., and a few others, are restricted by it. The fish-fauna is very similar to that of the Eastern region, under which it will be considered.

The *Eastern region* differs from the Austroriparian almost entirely in what it lacks, and agrees with it in all those peculiarities by which it is so widely separated from the Central region. No genus of mammals is found in it which does not range into the Central or other region, excepting *Condylura* (star-nosed mole); but numerous species are confined to it, not extending into the *Austroriparian*. These number from twenty to twenty-five. Among birds, the following genera are shared with the more southern region only: *Quiscalus*, *Sciurus*, *Oporornis*, *Helmitherus*, *Protonotaria*, *Parula*, *Mniotilta*, *Ortyx*. No genus of Reptiles, and but one of Batrachians (*Gyrinophilus*), is confined to this region; but it shares all it possesses with the Austroriparian. It has but three genera of lizards, viz, *Cnemidophorus*, *Eumeces*, and *Sceloporus*, which are universally Nearctic. The Batrachian genera not found in the Central are—

Scaphiopus.
Gyrinophilus.
Spelerpes.
Plethodon.
Hemidactylium.
Desmatognathus.
Menopoma.
Necturus.

The characteristics of the fish-fauna of Eastern Nearctica are much more marked; two entire orders, represented by the gar (*Ginglymodi*) and dog-fish (*Halecomorphi*), are confined to it, and a series of genera of *Percidae*, embracing many species, known as *Etheostominae*, have the same range. The *Siluridae* all belong here, as well as a great majority of the genera of *Cyprinidae* and *Catostomidae*. In all of these divisions, the region is very rich in species, owing to the abundance of everflowing rivers and streams which drain it. The *Polyodontidae* (spoon-bill or paddle-fish) are not found in any of the other regions.*

The *Central* region is characterized by the general absence of forests, as compared with the Eastern. It presents two distinct divisions, each peculiar in its vegetation: the division of the plains, which extends from the eastern border to the Rocky Mountains; and the Rocky Mountain region itself, which extends to the Sierra Nevada. The former is covered with grass, and is almost totally treeless; the latter is covered with "sage-brush" (*Artemisia*), a short stout bush, which forms extensive areas of treeless brush. The grass-covered plains are the range of the bison, though it formerly sought also the tracts of grass occasionally found among the *Artemisia*. The region, as a whole, is distinguished from the Eastern by the possession of several genera of ruminating Artiodactyles, *i. e.*, *Antilocapra*, *Haplocerus*, and *Ovis*, as well as certain species of the same group, *i. e.*, *Cariacus macrotis* (black-tailed deer) and *C. leucurus*. Other genera of mammals which distinguish it from the Eastern are *Taxidea*, *Cynomys*, *Spermophilus*, *Dipodomys*, *Perognathus*, and *Lagomys*. A few species of *Spermophilus* extend into the northwestern portion of the Eastern; while the extensive genus *Geomys* (the subterranean gophers) range over the Central subregion, and into the Western and Gulf States the Austroriparian as far as the Savannah River. A great many species of birds are peculiar to the Central region, and the following genera:

Oroscoptes.
Hydrobata.
Myiadestes.
Neocorys.
Salpinctes.
Picicorvus.
Chondestes.
Calamospiza.
Embernagra.
Centrocercus.
Pediocœtes.

* Excepting the course of the Mississippi, and perhaps the Rio Grande.

The game-birds of the Central region are larger than those of the Eastern. Such are the sage-cock, *Centrocercus urophasianus;* the *Pediœcetes phasianellus*, or cock of the plains; the *Tetrao obscurus*; several ptarmigan (*Lagopus*); and *Bonasa;* the last three Palæarctic genera also.

The reptiles are not numerous, and tortoises are especially rare. Besides the genera of lizards characteristic of the Eastern district, it adds *Phrynosoma*, *Crotaphytus*, and *Holbrookia*. Among snakes, no genus is peculiar, and the moccasins and *Elaps* are wanting. There is but one, possibly two, species of rattlesnake. Batrachians are few; most of the genera of *Anura* are found, except *Hyla*. Among salamanders, the only genus is *Amblystoma;* but this is abundant, its large larvæ developing in the temporary pools of many arid regions. The burrowing-frog, *Spea bombifrons*, ranges the same region, and breeds in much the same way. No genus of Batrachians or Reptiles is peculiar to the Central region.

Fishes are few in families and species, largely in consequence of the poverty of the region in rivers and streams. In the Western Colorado and the Humboldt, perch, pike, Siluridæ, herring, cod, eels, gar, dog-fish, and sturgeon are entirely wanting. *Cyprinidæ*, *Catostomidæ*, *Salmonidæ*, and *Cottidæ* are the only families abundant in individuals and species. The same remarks apply in great part to the Columbia River, where, however, the *Salmonidæ* have a great development. These salmon are principally marine species, which ascend the river to deposit their spawn. They belong to many species, all peculiar to the region, and embrace incredible numbers of individuals.

The *Pacific* region is nearly related to the Central, and, as it consists of only the narrow district west of the Sierra Nevada, might be regarded as a subdivision of it. It, however, lacks the mammalian genera *Bos* and *Antilocapra*, and possesses certain peculiar genera of birds, as *Geococcyx* (ground-cuckoo or chaparral-cock), *Chamæa*, and *Oreortyx* (mountain-partridge). Of marine mammalia, there are several peculiar types, as the eared seals (*Otariidæ*) and sea-otter (*Enhydra*). There are some genera of reptiles, *e. g.*, *Charina*, related to the Boas, *Lodia*, *Aniella*, *Gerrhonotus*, and *Xantusia*, which do not occur in the Central subregion. There are three characteristic genera of *Batrachia*, all salamanders, viz, *Aneides*, *Batrachoseps*, and *Dicamptodon;* while the Eastern genera *Plethodon* and *Diemyctylus* re-appear after skipping the entire Central district. The other types of Eastern *Anura* are found here, there being two species of *Hyla*.

A single species of tortoise (*Chelopus marmoratus*) exists in the Pacific region.

The fresh-water fish-fauna is much like that of the Central district in being poor in types. It adds the viviparous *Pharyngognathi* of the family of *Embiotocidae*, which is represented by a number of species. The marine fauna differs from that of the east coast in the great number of species of *Salmo* and *Sebastes* and the variety of types of *Cottidae*. In its northern regions, the genus *Chirus* and allies have their peculiar habitat. The singular genus *Blepsias* (related to *Cottus*) exists on the same coast, and several valuable species of cods (*Gadus auratus*, *G. periscopus*, and *Brachygadus minutus*), with the peculiar form *Bathymaster*, belong especially to the northern coasts.

The *Sonoran* region is strongly marked among the faunae already described. It is deficient in the species of ruminating Mammalia found in the Central, and possesses a smaller number of species of mammals than any of the others. Of birds, a few genera and several species are different from those of the Central; such are *Callipepla* (partridge), *Cichlopsis*, *Mitrephorus* (*Tyrannidae*), *Campylorhynchus*, and *Geococcyx*. Most of these genera occur in Mexico, and the last-named in California also. It is in Reptiles that the great peculiarity of this region appears. The following genera are not found in any of the other regions described:

LIZARDS.

Heloderma.
Sauromalus.
Uma.
Coleonyx.

SERPENTS.

Gyalopium.
Chionactis.
Sonora.
Rhinochilus.
Chilopoma.

Eight other genera of Reptilia are peculiar to this fauna and that of the Lower Californian region, under which they are enumerated. *Heloderma*, *Coleonyx*, and allies of *Gyalopium* of the above list are more largely developed in species and individuals in the Mexican region of the Neotropical realm. Every one of the five genera of serpents of the Sonoran

region is characterized by a peculiar structure of the rostral plate, which is produced either anteriorly or laterally to an unusual degree; two of the genera (*Phimothyra* and *Chilomeniscus*), common to the Lower Californian region, present the same peculiarity.

This region is the headquarters of the rattlesnakes, there being no less than nine species found in it, of which six are peculiar. It also possesses a majority of the species of horned toads (*Phrynosoma*); only four of the North American species being unknown there. The Testudinate fauna is very poor, possessing a few species of Nearctic character, and three *Cinosterna*, two of them of Mexican type.

The Batrachian fauna exhibits but one genus of *Urodela*, but several of the *Anura*. Appropriately to its arid character, there is but one *Rana*, but six species of toad (*Bufo*), this being the headquarters of that genus in the Regnum Nearcticum. The eastern genus *Scaphiopus* appears here, instead of the *Spea* of the other western regions. There is one species of tree-frog.

Two species of turtles of the *Cinosternidae* have been found. The fresh-water fish-fauna is very poor, and but little known. In the Colorado River proper, the *Salmonidae* and *Cottidae* appear to be wanting, leaving only *Cyprinidae* and *Catostomidae*. A strongly-marked division of the former, the *Plagopterinae*, which embraces three genera, is mainly restricted to the Colorado River drainage, and is the most striking feature of the fish-fauna of the Sonoran region.

The *Lower Californian* region much more nearly resembles the Sonoran than the *Pacific* region. It possesses, however, many peculiar species of birds and reptiles. Scincs appear to be wanting, but other lizards abound. The following genera of reptiles have been found here, which do not occur in any other region of Nearctica:

LIZARDS.

Verticaria.
Diplodactylus.
Cyclura.

SNAKES.

Lichanura.

These, except the last, have been found in Mexico or South America. It shares with the Sonoran only, the following:

LIZARDS.

Dipsosaurus.
Callisaurus.
Uta.
Phyllodactylus.

SNAKES.

Trimorphodon.
Hypsiglena.
Phimothyra.
Chilomeniscus.

These genera constitute the most characteristic feature of the two faunae, not occurring in any other part of North America. *Trimorphodon*, *Hypsiglena*, and *Phyllodactylus* are well represented in Mexico.

Of Batrachians we have, like the Sonoran, *Hyla*, *Scaphiopus*, and *Bufo*, but, on the other hand, *Plethodon*, as in the Pacific and Eastern. Of the fresh-water fish-fauna, nothing is known; the streams are few and small. This region extends northward to the southern boundary of California.

Among the Invertebrata, the *Mollusca* present facts of distribution similar in significance to those derived from the study of the *Vertebrata*. Thus the Eastern, the Middle, and the Pacific districts are plainly marked out in the fresh-water and land Mollusca. To the former are entirely confined the *Streptopomatidae* and the great majority of the *Unionidae*, which together constitute more than two-thirds the species of the Nearctic realm. Of land-shells, the great series of toothed snails (*Mesodontinae*), which embraces many genera and species, is almost confined to the Eastern subregion. The same is true of the snails of the group of *Gastrodontinae* and of the genera *Hyalina* and *Hygromia*. The Central subregion is characterized by its poverty in all that respects Mollusca, while several genera of land-snails are peculiar to the Pacific region, and are largely represented by species there. One hundred of the four hundred land-shells described from the Regnum Nearcticum belong to the western coast. Among snails, the genera *Aglaja*, *Arionta*, and *Polymita* are represented by handsome species. *Macrocyclis* and *Bineya* belong especially to this region.

As is to be supposed, the *Insects* indicate a greater number of subdivisions than the other animals. The fresh-water *Crustacea* have been but sparingly studied. They seem, however, to have a wide distribution; thus *Cambarus* (craw-fish) and *Artemia* are found everywhere where physical conditions are suitable.

V.—THE AUSTRORIPARIAN REGION.

V[a]. Reptiles whose distribution corresponds with the area of the Austroriparian region—24:

Trachystomata.

Siren lacertina.

Anura.

Engystoma carolinense.
Acris gryllus gryllus.
Hyla squirella.
Hyla carolinensis.

Ophidia.

Caudisona miliaria.
Ancistrodon piscivorus.
Elaps fulvius.
Haldea striatula.
Farancia abacura.
Cemophora coccinea.
Ophibolus doliatus coccineus.
Coluber obsoletus confinis.
Coluber guttatus.
Tropidonotus fasciatus.

Lacertilia.

Oligosoma laterale.
Cnemidophorus sexlineatus sexlineatus.
Opheosaurus ventralis.
Anolis principalis.

Testudinata.

Macrochelys lacertina (except Atlantic slope).
Pseudemys mobiliensis (except Atlantic slope).
Pseudemys concinna.
Testudo carolina.

Crocodilia.

Alligator mississippiensis.

As aleady remarked, this fauna is composed of the Floridan, Louisianian, and Texan districts.

The *Floridan* district contains either peculiar species of animals, or those of West Indian or South American character. The characteristic birds are chiefly of the latter character, but among reptiles the following are confined to it:

V[b]. Species confined to the Floridan district of the above—18:

Urodela.

Manculus remifer.

Anura.

Hyla gratiosa.
Lithodytes ricordii (Cuba; Bahamas).
Rana areolata capito.

Ophidia.

Elaps distans (Sonoran also).
Contia pygaea.
Eutaenia sackenii.
Tropidonotus compsolaemus.
Tropidonotus compressicaudus.
Tropidonotus ustus.
Tropidonotus cyclopium.
Helicops allenii.

Lacertilia.

Rhineura floridana.
Eumeces egregius.
Eumeces onocrepis.
Sceloporus floridanus.
Sphaerodactylus notatus (Cuba).

Crocodilia.

Crocodilus americanus (Cuba).

Of the above, the species of *Crocodilus*, *Sphaerodactylus*, and *Lithodytes* only, have been found in the Antilles. The genera of the above list which are peculiar to the Floridan district of the Nearctic fauna are—

Lithodytes.
Helicops.
Rhineüra.
Sphaerodactylus.

A venomous snake, the *Elaps distans*, is common to this district and the Sonoran fauna.

Some small mammals are confined to this region also. The genera of birds that do not range north of it are—

Certhiola.
Zenaeda, *Oreopelia*, *Starnaenas* } Pigeons.
Rostrhamus, *Polyborus* } Raptores.
Aramus, *Audubonia* } Waders.
Phoenicopterus.
Haliplana, *Anoüs* } Terns.

The *Louisianian* district possesses the peculiarities of the austroriparian fauna already pointed out, minus those of Florida and Texas. Of *Mammalia*, the genera *Alces*, *Mustela*, *Jaculus*, *Arctomys*, *Fiber*, and *Condylura* are wanting, as well as the red-squirrel, Canada lynx, gray-rabbit, etc. Its most remarkable birds are the nonpareil finch, ivory-billed woodpecker, parrakeet, etc., while its *Elaps fulvius*, or coral-snake, is one of the most beautiful of the order. A large and dangerous rattlesnake is also confined to it, viz, *Caudisona adamantea*, and the well-known moccasin *Ancistrodon piscivorus* does not range outside of its boundaries. A species of the West Indian *Dromicus* (serpents) has been found on the Atlantic coast.

V°. Species confined to the Louisianian district—36: (E confined to the Eastern portion; W to the Western, as far as known).

Trachystomata.

Pseudobranchus striatus. E.

Proteida.

Necturus punctatus. E.

Urodela.

Amphiuma means.
Muraenopsis tridactyla. W.
Amblystoma talpoideum. E.
Amblystoma cingulatum. E.

Stereochilus marginatum. E.
Manculus quadridigitatus. E.
Spelerpes guttolineatus. E.

Anura.

Bufo lentiginosus lentiginosus.
Bufo quercicus.
Chorophilus nigritus.
Chorophilus angulatus.
Chorophilus oculatus.
Chorophilus ornatus.

Ophidia.

Crotalus adamanteus adamanteus.
Virginia harperti.
Virginia elegans. W.
Tantilla coronata.
Abastor erythrogrammus.
Osceola elapsoidea. E.
Ophibolus rhombomaculatus.
Coluber quadrivittatus. E.
Spilotes couperii. E.
Bascanium flagelliforme flagelliforme. E.
Bascanium anthicum. W.
Tropidonotus taxispilotus.
Heterodon simus simus.

Testudinata.

Aspidonectes asper. W.
Aspidonectes ferox.
Aromochelys carinatus.
Pseudemys hieroglyphica. (?)
Pseudemys scabra.
Chrysemys reticulata.
Cistudo clausa triunguis. (Penna.)

A number of the genera of the above catalogue are not yet known to extend their range into the Floridan or Texan districts, as follows:

Pseudobranchus.
Muraenopsis.
Virginia.
Abastor.
Osceola.

The genus *Virginia* occurs within the State of Texas, but whether within the Texan district is not certain, as the line separating the latter from the Louisianian district is not well known. The *Spelerpes multiplicatus*, a rare salamander from Western Arkansas, is in the same way, of uncertain reference.

The species of the following list have a peculiar range, some of them (marked E) extending beyond the borders of the Austroriparian region V[d]. Species which range along the Mississippi Valley and not eastward of it—13:

Urodela.

Amblystoma microstomum (E.).

Ophidia.

Carphophiops helenae.
Virginia elegans.
Ophibolus calligaster (E.).
Coluber emoryi (E.).
Eutaenia faireyi (E.).
Eutaenia proxima.
Tropidonotus grahamii (E.).
Tropidonotus rhombifer.

Testudinata.

Macrochelys lacertina.
Pseudemys troostii.
Malacoclemmys geographica (E.).
Malacoclemmys pseudogeographica (E.).

The *Texan* district of the *Austroriparian* region is not the range of any genus not found elsewhere, but possesses the peculiar genera of the Louisianian district, many of which are represented by corresponding and peculiar species. Seventeen such species of reptiles may be enumerated, besides a salamander and a toad. Several species of mammals are also peculiar to it, *i. e.*, five rodents and two skunks. Of birds, three appear to be, so far as known, peculiar, *Ortyx texanus*, *Vireo atricapillus*, and *Milvulus forficatus*. Many Mexican birds are found on the Rio Grande, while a few enter Texas to a greater distance, as *Icterus parisorum*. The high northwestern regions of the State should be assigned to the Sonoran fauna, as the range of the two partridges (*Callipepla squamata* and *Cyrtonyx massena*) and the finch (*Peucaea cassinii*).

Several genera of mammals, birds, and reptiles exist in the Texan region, which constitute its chief claim for distinction from the Louisianian; these are—

MAMMALS.

Dicotyles (Nt.).
Bassaris (P. Nt.).

BIRDS.

Geococcyx (P. S.).

REPTILES.

Holbrookia (C. S.).
Phrynosoma (C. S. P.).
Stenostoma (Nt. P.).

None of these are peculiar: those marked (P.) being also found in the Pacific; (C.) the Central; (S.) the Sonoran; and (Nt.) the Neotropical region. Two striking species of mammals range through the Texan district, viz, the jaguar and the peccary.

V°. Species confined to the Texan district—21:

Caducibranchiata.

Amblystoma texanum.

Anura.

Bufo valliceps (also Mexico).
Chorophilus triseriatus clarkii.
Hyla carolinensis semifasciata.
Rana areolata areolata.

Ophidia.

Crotalus adamanteus atrox.
Ancistrodon piscivorus pugnax.
Elaps fulvius tener.
Tantilla gracilis.
Tantilla hallowellii.
Tantilla nigriceps.
Contia episcopa.
Ophibolus doliatus annulatus.
Diadophis punctatus stictogenys.
Coluber lindheimerii.

Eutaenia marciana (extends W.).
Tropidonotus clarkii.
Tropidonotus sipedon woodhousei.

Lacertilia.

Holbrookia texana.
Phrynosoma cornutum.

Testudinata.

Aspidonectes emoryi.

VI.—THE EASTERN REGION.

This fauna presents four districts, viz, the Carolinian; the Alleghenian; the Canadian; and the Hudsonian. These are distinguished by the ranges of mammals and reptiles, and the breeding-places of birds. The Carolinian fauna extends in a belt north of the Louisianian, and south of the isothermal of 71°. Its northern boundary is said to extend from Long Island, south of the hill-region of New Jersey, to the southeastern corner of Pennsylvania, and thence inland. It embraces a wide belt in Maryland and Virginia, and all of central North Carolina, and then narrows very much in passing round south of the Alleghenies of Georgia. It extends north again, occupying East Tennessee, West Virginia, Kentucky, Indiana, the greater parts of Illinois and Ohio, and the southern border of Michigan. It includes also Southern Wisconsin and Minnesota, all of Iowa, and the greater part of Missouri. The Alleghanian embraces the States north of the line just described, excepting the regions pertaining to the Canadian fauna, which I now describe. This includes Northern Maine, New Hampshire, and Vermont, with the Green Mountains; the Adirondacks and summits of the Alleghany Mountains as far as Georgia. It includes Canada East and north of the lakes. The Hudsonian fauna is entirely north of the isothermal of 50°. It has great extent west of Hudson's Bay, and is narrowed southeastward to Newfoundland.

VI[a]. Species peculiar to the Eastern region—34:

Proteida.

Necturus lateralis.

Caducibranchiata.

Menopoma fuscum.
Amblystoma bicolor.

Amblystoma xiphias.
Amblystoma jeffersonianum.
Spelerpes ruber montanus.
Gyrinophilus porphyriticus.
Desmognathus ochrophaea.
Desmognathus fusca fusca.
Desmognathus nigra.

Anura.

Bufo americanus fowlerii.
Chorophilus triseriatus corporalis.
Hyla pickeringii.
Rana palustris.
Rana temporaria silvatica.
Rana temporaria cantabrigensis
Rana septentrionalis (nearly).

Ophidia.

Caudisona tergemina.
Virginia valeriae.
Ophibolus doliatus triangulum.
Cyclophis vernalis (rare south).
Coluber vulpinus.
Pityophis sayi sayi.
Storeria occipitomaculata.
Eutaenia sirtalis ordinata.
Tropidoclonium kirtlandii.

Lacertilia.

Eumeces anthracinus.

Testudinata.

Aspidonectes spinifer.
Amyda mutica.
Pseudemys rugosa.
Chelopus guttatus.
Chelopus muhlenbergii.
Chelopus insculptus.
Emys meleagris.

The *Carolinian* fauna is not so marked among reptiles as among birds. One genus of the former, *Cnemidophorus* (swift lizard), does not range north of it, with the genera *Virginia*, *Cyclophis*, *Haldea*, and *Pityophis* among serpents. Species confined in their northern range by the same limit are—

Ophibolus doliatus doliatus.
Ophibolus getulus.
Tropidonotus sipedon erythrogaster.
Pseudemys rugosa.
Malacoclemmys palustris.
Hyla andersonii.

Genera of birds restricted in the same way are—

Guiraca.
Helmitherus.
Mimus.
Polioptila.
Gallinula.
Herodias.
Florida.
Himantopus.
Recurvirostra.

The *Alleghanian* district includes nearly all of the remaining species of Reptiles and several Batrachians. The genera of these which do not extend north of it are the following:

LIZARDS.

Sceloporus.
Eumeces.

SNAKES.

Carphophiops.
Coluber.
Cyclophis.
Tropidonotus.
Ophibolus.
Heterodon.
Caudisona.
Crotalus.
Ancistrodon.

BATRACHIA.

Chorophilus.
Hyla.
Hemidactylium.
Desmognathus.
Menopoma.
Necturus.

The species thus restricted number twenty-six. The genera of birds which do not range north of this fauna are numerous. They are—

Sialia.
Vireo.
Pyranga.
Harporhynchus.
Troglodytes.
Cyanospiza.
Pipilo.
Ammodromus.
Sturnella.
Icterus.
Zenaedura.
Cupidonia.
Ortyx.
Meleagris.
Ardetta.
Rallus.

The catamount, red-squirrel, jumping-mouse, gray-rabbit, star-nosed mole, and elk, do not range south of this fauna.

The *Canadian* fauna is distinguished for its few reptiles (there being only seven species) and Batrachia, as follows:

TORTOISES.

Chelydra serpentina.
Chelopus insculptus.
Chrysemys picta.

SNAKES.

Bascanium constrictor.
Eutaenia sirtalis.
Diadophis punctatus.
Storeria occipitomaculata.

FROGS.

Rana temporaria cantabrigensis.
Rana septentrionalis.

SALAMANDERS.

Desmognathus ochrophaea.
Desmognathus nigra.
Spelerpes ruber.
Spelerpes bilineatus.
Spelerpes longicauda.

This fauna extends south along the crests of the Alleghenies, where we find the catamount, snow-bird, red-squirrel, and brook-trout (*Salmo fontinalis*), and *Desmognathus ochrophaea*, as far as Georgia.

Several mammals are restricted in northward range by the boundary of this fauna; such are the buffalo, raccoon, skunk, wild-cat, panther, star-nosed mole, etc.; and the moose, caribou, wolverine, and fisher do not range, according to J. A. Allen, south of it.

VI[b]. Species confined to the Canadian district, or nearly so:

Urodela.

Amblystoma jeffersonianum laterale.

Anura.

Bufo lentiginosus fowlerii.
Rana septentrionalis.
Rana temporaria cantabrigensis.

In the *Hudsonian* district there are no reptiles, and the fresh waters begin to present various new species of *Salmo* and *Coregonus* (trout and white-fish). The catamount, fisher, ermine, black-bear, red-squirrel, ground-hog, etc., do not range north of it. The following singing-birds breed there:

Anthus ludovicianus.
Saxicola oenanthe.
Ampelis garrula.
Aegiothus linaria.
Plectrophanes lapponica.
Plectrophanes nivalis.
Plectrophanes picta.
Leucosticte tephrocotis.

The first and last two are the only species not also found in Europe. Numerous waders and swimming-birds breed in this region, the whole

number being thirty-six; while ninety-six species of birds do not wander north of it. To this category many of the common species of the Middle States belong.

North of this the species of vertebrates are circumpolar or arctic.

The ichthyological fauna of the two Eastern subregions remains to be considered. For the present, they will be united, though the distribution of fresh-water fishes is governed by laws similar to those controlling terrestrial vertebrates and other animals, in spite of the seemingly confined nature of their habitat. With this general principle in view, we may revert briefly to this distribution over this district of the Nearctic region. This large area is characterized by the distribution of several species in all its waters, or nearly so, so far as yet examined—those of *Semotilus*, *Ceratichthys*, *Hypsilepis*, *Catostomus*, etc., or by the universal recurrence of the same in suitable situations; and by the representation of these and other genera by nearly allied species in its different portions. The fauna of the tributaries of the Mississippi constitutes, it might be said, that of our district; while the slight variations presented by the Atlantic-coast streams might be regarded as exceptional. The fauna of the great lakes combines the peculiarities of both, possessing as a special peculiarity, (I), which belongs to the Lake region, which, in the district, commences at latitude 42° and extends to the Arctic regions, the range of the genus Coregonus. The peculiarity of the Atlantic subdistrict (II) may be said to be the abundance of *Esox*, *Salmo*, and *Anguilla*, and the absence of *Haploidonotus*. The first two are abundant in the Lake region, while *Anguilla* and *Haploidonotus* have but a partial distribution there. In (III), the Mississippi basin, *Esox* is represented by but few species, and remarkably few individuals. *Salmo* occurs abundantly in the upper parts of the Missouri tributaries, exists in the western mountain-streams of the Alleghanies, becoming rare in those of the Kanawha, and only occurring near the highest summits in those of the Tennessee, south to the line of South Carolina. It is especially characterized by the paddle-fish (*Spatularia* or *Polyodon*), the shovel-sturgeon (*Scaphirhynchops*), and the alligator-gar (*Atractosteus*); also by the buffalo (*Bubalichthys*), the *Cycleptus*, etc., among suckers, and the fork-tailed catfish (*Ichthaelurus*). Among Percomorphs, the *Haploidonotus* is the characteristic genus; and among those allied to the herring, the genus *Hyodon*. Numerous species are confined to its affluents. The gradation from the Mississippi grouping of species to the Atlantic is very gradual, and takes place in successional order from

those emptying into the Gulf of Mexico toward the east and northeast, until we reach the rivers of Massachusetts and Maine, where the greatest modification of the fauna exists. The latter fact has been pointed out by Agassiz, who calls this region a "zoölogical island," and enumerates the characteristic Nearctic genera which are wanting there. I give now a list showing the points at which Mississippi genera cease, as we follow the rivers of the Gulf and Atlantic coasts, so far as our present knowledge extends.

Gulf rivers: *Haploidonotus* has not yet been indicated from eastward of these, except in the Lake area.

Roanoke: *Campostoma* ceases here.

James: *Micropterus* and *Ambloplites* cease.

Potomac: *Pomoxys*, according to Professor Baird (verb. commn.), ceases here.

Susquehanna: *Ceratichthys*, *Exoglossum*, *Chrosomus*, *Carpiodes*, cease.

Delaware: *Clinostomus*, *Hypsilepis analostanus*, *Enneacanthus*, and *Lepidosteus* cease.

Hudson: *Semotilus corporalis*, according to F. W. Putnam (verb. commn.), ceases.

The types remaining in the Atlantic waters of the New England district (IV) are first, then, *Salmo*, *Esox*, *Anguilla*, *Perca*; and, secondly, the general types *Boleosoma*. *Semotilus*, *Hypsilepis*, *Stilbe*, *Hybopsis* (*bifrenatus*), *Fundulus*, and *Amiurus*; and the Lake types *Lota* and *Coregonus*.

VII.—THE CENTRAL REGION.

VII[a]. Species peculiar to the Central region—12:

Anura.

Spea bombifrons.

Ophidia.

Ophibolus multistratus.
Eutaenia radix.
Eutaenia vagrans vagrans.
Eutaenia sirtalis parietalis.

Lacertilia.

Eumeces septentrionalis.
Eumeces inornatus.
Eumeces multivirgatus.
Holbrookia maculata maculata.
Phrynosoma douglassii douglassii.

Testudinata.

Pseudemys elegans.
Chrysemys oregonensis.
Cistudo ornata.

VIII.—THE PACIFIC REGION.

VIII[a]. Species confined to the Pacific region—44:

Urodela.

Amblystoma macrodactylum.
Amblystoma paroticum.
Amblystoma tenebrosum.
Amblystoma aterrimum.
Dicamptodon ensatus.
Batrachoseps attenuatus.
Batrachoseps nigriventris.
Batrachoseps pacificus.
Plethodon intermedius.
Plethodon oregonensis.
Anaides lugubris.
Anaides ferreus.
Diemyctylus torosus.

Anura.

Bufo halophilus.
Hyla regilla.
Hyla cadaverina.
Spea hammondii.
Rana temporaria aurora.
Rana pretiosa.

Ophidia.

Crotalus lucifer.
Contia mitis.
Lodia tenuis.
Pityophis catenifer.
Bascanium constrictor vetustum.
Eutaenia hammondii.
Eutaenia elegans.
Eutaenia sirtalis pickeringii.

Eutaenia sirtalis concinna.
Eutaenia sirtalis tetrataenia.
Eutaenia cooperii.
Eutaenia atrata.
Charina plumbea.
Stenostoma humile.

Lacertilia.

Aniella pulchra.
Eumeces skiltonianus.
Xantusia vigilis.
Barissia olivacea.
Gerrhonotus principis.
Gerrhonotus grandis.
Gerrhonotus scincicaudus.
Uta graciosa.
Uta schottii.
Phrynosoma blainvillei.

Testudinata.

Chelopus marmoratus.

Gerrhonotus multicarinatus is common to the Pacific and Lower California regions.

IX.—THE SONORAN REGION.

IX[a]. Species confined to the Sonoran region—68:

Anura.

Bufo alvarius.
Bufo debilis.
Bufo microscaphus.
Bufo speciosus.
Bufo lentiginosus frontosus.
Hyla eximia. (Mexico also.)
Hyla arenicolor.
Scaphiopus varius rectifrenis.
Scaphiopus couchii.

Ophidia.

Crotalus pyrrhus.
Crotalus cerastes.
Crotalus tigris.

Crotalus adamanteus scutulatus.
Crotalus molossus.
Caudisona edwardsii.
Elaps euryxanthus.
Chilomeniscus ephippicus.
Chilomeniscus cinctus.
Chionactis occipitalis.
Contia isozona.
Sonora semiannulata.
Gyalopium canum.
Rhinochilus lecontei.
Ophibolus pyrrhomelus.
Ophibolus getulus splendidus.
Diadophis regalis.
Hypsiglena ochrorhyncha chlorophaea.
Phimothyra grahamiae.
Bascanium flagelliforme piceum.
Chilopoma rufipunctatum.
Eutaenia macrostemma.
Eutaenia vagrans angustirostris.
Tropidonotus validus validus.
Tropidonotus sipedon couchii.
Stenostoma dulce.

Lacertilia.

Eumeces obsoletus.
Eumeces guttulatus.
Cnemidophorus grahamii.
Cnemidophorus inornatus.
Cnemidophorus octolineatus.
Cnemidophorus tessellatus gracilis.
Cnemidophorus tessellatus melanostethus.
Gerrhonotus nobilis.
Gerrhonotus infernalis.
Heloderma suspectum.
Callisaurus dracontoides ventralis.
Uma notata.
Sauromalus ater.
Crotaphytus reticulatus.
Uta ornata.

Sceloporus ornatus.
Sceloporus jarrovii.
Sceloporus poinsettii.
Sceloporus torquatus.
Sceloporus couchii.
Sceloporus marmoratus.
Sceloporus clarkii.
Phrynosoma modestum.
Phrynosoma maccallii.
Phrynosoma regale.
Phrynosoma planiceps.
Phrynosoma hernandezii.
Coleonyx variegatus.
Phyllodactylus tuberculatus.

Testudinata.

Cinosternum sonoriense.
Cinosternum henrici.
Cinosternum flavescens.
Testudo agassizii.

Phrynosoma platyrhinium has as yet been observed in Nevada only.

X.—THE LOWER CALIFORNIAN REGION.

X*. Species peculiar to the Lower Californian region—27:

Urodela.

Plethodon croceater.

Anura.

Hyla curta.

Ophidia.

Crotalus enyo.
Crotalus mitchellii.
Tantilla planiceps.
Chilomeniscus stramineus.
Ophibolus californiae.
Ophibolus getulus conjunctus.
Hypsiglena ochrorhyncha ochrorhyncha.
Phimothyra decurtata.
Pityophis vertebralis.
Bascanium aurigulum.

Tropidonotus validus celaeno.
Charina bottae.
Lichanura trivirgata.
Lichanura myriolepis.
Lichanura roseofusca.

Lacertilia.

Phyllodactylus unctus.
Phyllodactylus xanti.
Cnemidophorus maximus.
Verticaria hyperythra.
Callisaurus dracontoides.
Uta thalassina.
Uta nigricauda.
Sceloporus clarkii zosteromus.
Phrynosoma coronatum.
Cyclura hemilopha.

XI.—RELATION OF DISTRIBUTION TO PHYSICAL CAUSES.

The first observation with regard to the Batrachian and Reptilian fauna of North America is the usual one, viz, that the number of specific and generic types exhibits a rapid increase as we approach the tropics. Of the area inhabited by these forms of animals, less than one-fourth is included in the three Southern regions—the Austroriparian, the Sonoran, and the Lower Californian; yet these contain more than half of the entire number of species, and all but eight of the genera are found in them. Of this number, forty-two genera, or one-third of the total, is confined to within their boundaries. It is a truism directly resulting from the very small production of animal heat by these animals, that temperature, and therefore latitude, has the greatest influence on their life and distribution. This is exhibited in other ways than in multiplication of forms. It is well known, that although plainly-colored reptiles are not wanting in the tropics, brilliantly-colored species are much more abundant there than in temperate regions. Although the Regnum Nearcticum does not extend into the tropics, its southern districts are the habitat of most of the species characterized by bright colors. This is most instructively seen in species having a wide range. Such is the case with the southern subspecies of *Desmatognathus* among salamanders, and *Hyla* among frogs. So with snakes of the genera *Crotalus*, *Caudisona*, *Ophibolus*, *Bascanium*, and *Eutaenia*. It is

also true of the lizards of the genera *Phrynosoma*, *Holbrookia*, and
loporus. *Eutaenia* and *Sceloporus* become metallic in the Mexican
region, as is also the case with the Anoles. The North American spe
of *Anolis* does not display metallic luster, while a large part of thos
Mexico and a smaller proportion of those of the West Indies exhibit

Another important influence in the modification of the life in q
tion is the amount of terrestrial and atmospheric moisture. In
case of the Batrachia, this agent is as important as that of heat, s
a greater or less part of their life is, in most species, necessarily s
in the water. The reptiles are less dependent on it, but, as their
consists largely of insects, and as these in turn depend on vegeta
for sustenance, the modifying influence of moisture on their habits
be very great.

The Central region combines the disadvantages of low temp
ture, due to its elevation above the level of the sea, and of arid at
phere; hence its poverty in *Batrachia* and *Reptilia*. There are but
species of both classes peculiar to it, while a few others enter from
rounding areas.

The distribution in the other regions is evidently dependent on
same conditions. Thus the well-watered, forest-covered Eastern
Austroriparian regions are the home of the salamanders, the fr
the tree-toads, and the turtles. The dry and often barren Sonoran
Central regions abound in the lizards and the toads. The Pacifi
gion, which is intermediate in climatic character, exhibits a combina
of the two types of life; it unites an abundant lizard-fauna
numerous frogs and salamanders, while there is but one tortoise.

Another character of the reptilian life of arid regions is to be
in a peculiarity of coloration. This, which has been already obse
by the ornithologists, consists of a pallor, or arenaceous hue of
body, nearly corresponding with the tints of dry or sandy earth.
prevails throughout the Batrachia and Reptilia of the Sonoran
gion, although it is often relieved by markings of brilliant colo
which red is much the most usual. This peculiarity doubtless res
immediately from the power of metachrosis, or color-change, posse
by all cold-blooded Vertebrata, by means of which they readily ass
the color of the body on which they rest. That a prevalent colo
such bodies should lead to a habit of preference for that color is ne
sary, and as such habits become automatic, the permanence of the c
is naturally established.

Another peculiarity of the Sonoran region, and which it shares with a part of Mexico, is the predominance of snakes which possess an extraordinary development of the rostral shield either forward or outward. This has also been observed by Professor Jan, who referred such genera to a group he termed the *Probletorhinidae*, but which has not sufficient definition to be retained in the system. Of ten genera of snakes in the Nearctic region which possess the character, nine are found in the Sonoran subregion, five are peculiar to it, and it shares two with the Lower Californian subregion only. One of the latter (*Phimothyra*) is closely imitated by a genus (*Lytorhynchus*) which occurs on the borders of the African Sahara. The *Heterodon* of the Eastern States, though not confined to the sandy coast-regions, greatly abounds there; and the South American species skip the forest-covered Amazon Valley and reappear on the plains of the Paraguay and Parana. As the Sonoran region embraces a number of desert areas, it is altogether probable that the peculiar forms in question have a direct relation to the removing of dry earth and sand, in the search for concealment and food. A modification of foot-structure, supposed to have relation to the same end, is seen in the movable spines on the outer side of the foot in the genus *Uma*, a character exhibited in higher perfection in the South African genus *Ptenopus*.*

The abundance of Bufones is doubtless due in part to their adaptation to life in dry regions. They are mostly furnished with tarsal bones especially developed for excavating purposes.

* Proc. Acad. Phila., 1868, p. 321.

PART IV.

BIBLIOGRAPHY.

The present list only includes the titles of works and memoirs which embrace discussions of systematic or distributional relations of the reptiles of the Regio Nearctica. Those embracing descriptions of species only will be added at a future time.

The subject of general geographical distribution has been especially investigated by Sclater, Huxley, and the writer; while Baird, Agassiz, LeConte, Verrill, Allen, and the writer have devoted themselves especially to the distribution of the animals of the fauna Nearctica. In 1856, Dr. Hallowell remarked the rarity of salamanders and turtles in the Sonoran region,* and Professor Baird has especially demonstrated the complementary relation exhibited in the distribution of lizards and turtles in North America. Professor Verrill and J. A. Allen have defined the faunal subdivisions of Eastern North America with great success, basing their conclusions on the distribution of birds and *Mammalia*. The writer subsequently defined the Sonoran and Lower Californian regions, and elevated the Austroriparian area to the same value, adopting, also, the districts of Verrill and Allen. In the present essay I am greatly indebted to the learned work of J. A. Allen for information on the distribution of birds, as well as to the previous essay of Professor Baird on the birds and mammals.

A.— *Works on the classification of Batrachia and Reptilia.*

1817. Cuvier. Règne Animal. First edition. Paris.
1820. Merrem. Systema Amphibiorum.
1824. Wagler, in Spix Serpentes Brazilium.
1825. Latreille. Familles Naturelles du Règne Animal. Paris.
1825. Gray. Genera of Reptiles in Annals of Philosophy. London.
1826 (June). Fitzinger. Neue Classification der Reptilien.

* Proc. Acad. Phila., 1856, p. 309.

1826 (October). Boie, H. Erpetologie von Java in Ferrusac's Bulletin des Sciences Naturelles et Géologiques.

1827. Boie, F., in Isis von Oken, p. 508.

1830. Wagler. Natürliches System der Amphibien.

1831. Müller. Beiträge zur Anatomie der Amphibien, Tiedemann u Treviranus' Zeitschrift für Physiologie, iv, p. 199.

1832. Wiegmann und Ruthe. Handbuch der Zoologie. Berlin.

1832. Bonaparte. Saggio di una Distribuzione Metodica degli Animali Vertebrati. Rome.

1834. Duméril et Bibron. Erpétologie Générale, vol. i. General Classification and Anatomy. The *Testudinata*. Paris.

1834. Wiegmann. Herpetologia Mexicana. Berlin.

1835. Duméril et Bibron. Erpétologie Générale, vol. ii. *Testudinata; Lacertilia*, in general.

1836. Duméril et Bibron. Erpétologie Générale, vol. iii. *Crocodilia, Chamaeleontidae, Gecconidae, Varanidae.*

1837. Duméril et Bibron. Erpétologie Générale, vol. iv. Sauriens (*Iguanidae* and *Agamidae*). Paris.

1837. Schlegel. Essai sur le Physionomie des Serpens. Hague.

1839. Duméril et Bibron. Erpétologie Générale, vol. v. *Lacertidae, Chalcididae*, and *Scincidae.*

1841. Duméril et Bibron. Erpétologie Générale, vol. viii. *Batrachia Gymnophiona*, and *Anura.*

1843. Fitzinger. Systema Reptilium. Vienna.

1844. Duméril et Bibron. Erpétologie Générale, vol. vi. *Ophidia* in general; *Scolecophidia* and *Asinea*, parts.

1844. Gray. Catalogue of Tortoises, Crocodiles, and Amphisbaenians in the British Museum. London.

1845. Gray. Catalogue of the Lizards in the British Museum. London.

1849. Gray. Catalogue of Specimens of Snakes in the British Museum. London.

1849. Baird. Revision of the North American Tailed Batrachia, etc. Journal of Academy, Philadelphia, vol. i, p. 281.

1850. Gray. Catalogue of the Specimens of Amphibia in the British Museum. London.

1853. (January). Baird and Girard. Catalogue of the Serpents of North America. Washington.

1853. Duméril. Prodrome de la Classification des Reptiles Ophidiens Institut de France.

1854. Duméril et Bibron. Erpétologie Générale. Tome vii, part 1, *Ophidia Asinea;* part 2, Venomous Serpents. Tome ix, *Batrachia Urodela.* Tome x, plates.

1854. LeConte, J. Catalogue of the North American *Testudinata.* Porceedings of Philadelphia Academy, vol. vii.

1855. Gray. Catalogue of the Shield Reptiles in the British Museum. London.

1857. Agassiz. Contributions to the Natural History of the United States, part ii. North American *Testudinata*, p. 233.

1858. Gray. On the Classification of the Old World Salamanders. Proceedings of the Zoölogical Society, London, p. 235.

1858. Günther. Catalogue of the Colubrine Serpents in the British Museum. London.

1858. Günther. Catalogue of the Batrachia Salientia in the British Museum. London.

1859. Cope. Catalogue of the Venomous Serpents. Proceedings of the Academy, Philadelphia, 1859, p. 330.

1860. Owen. Paleontology. London. (Arrangement of Extinct Reptiles.)

1863. Jan. Elenco Sistematico degli Ofidi Descritti e Disegnati per l'Iconografia Generale. Milan.

1864. Cope. Characters of the Higher Groups of Reptilia Squamata. Proceedings of the Academy, Philadelphia, p. 224.

1864. Günther. Reptiles of British India. Ray Society.

1865. Cope. Sketch of the Primary Groups of Batrachia Salientia Natural History Review. London.

1866. Cope. On the Arciferous *Anura* and the *Urodela.* Journal of the Academy of Natural Sciences, Philadelphia.

1867. Cope. On the Families of the Raniform *Anura.* Journal of the Academy, Philadelphia, p. 189.

1867. Günther. Contribution to the Anatomy of *Hatteria.* Philosophical Transactions.

1869. Cope. Synopsis of the Extinct Batrachia, Reptilia, and Aves of North America. Transactions of the American Philosophical Society, vol. xiv.

1869. Cope. A Review of the Species of *Plethodontidae* and *Desmognathidae.* Proceedings of the Academy, Philadelphia, p. 93.

1870. Cope. On the Homologies of some of the Cranial Bones of the Reptilia, and on the Systematic Arrangement of the Class. Proceedings of the American Association for the Advancement of Science, p. 194. Cambridge.

1870. Gray. Supplement to the Catalogue of Shield Reptiles in the British Museum. London.

1872. Huxley. Anatomy of the Vertebrata. London.

B.—*Works treating of the geographical distribution of North American Batrachia and Reptilia.*

1857. Agassiz. Contributions to the Natural History of the United States, vol. i, part i, p. 449. On the Geographical Distribution of North American Testudinata.

1866. Baird. The Distribution and Migration of North American Birds. American Journal of the Sciences and Arts, p. 78, 184–347 (January).

1866. Verrill. Report of some Investigations upon the Geographical Distribution of North American Birds. Proceedings of the Boston Society of Natural History, vol. x, p. 259 (May).

1866. Cope. On the *Reptilia* and *Batrachia* of the Sonoran Province of the Nearctic Region. Proceedings of the Philadelphia Academy, p. 300 (October).

1869. Cope. On the Origin of Genera. Philadelphia.

1871. Allen, J. A. Bulletin of the Museum of Comparative Zoölogy, vol. ii, No. 3, p. 404.

1873. Cope. Gray's Atlas of the United States, p. 32. Geographical Distribution of North American Vertebrata (with map).

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No. 2.

PUBLISHED UNDER THE DIRECTION OF THE SMITHSONIAN INSTITUTION.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1875.

Department of the Interior:

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— 2 —

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UNITED STATES NATIONAL MUSEUM.

No. 2.

PUBLISHED UNDER THE DIRECTION OF THE SMITHSONIAN INSTITUTION.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1875.

CONTRIBUTIONS

TO THE

NATURAL HISTORY

OF

KERGUELEN ISLAND,

MADE IN CONNECTION WITH THE AMERICAN TRANSIT-OF-VENUS EXPEDITION, 1874-75.

BY

J. H. KIDDER, M. D.,

PASSED ASSISTANT SURGEON U. S. NAVY.

I.

ORNITHOLOGY.

EDITED BY DR. ELLIOTT COUES, U. S. A.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1875.

ADVERTISEMENT.

This work is the second of a series of papers intended to illustrate the collections of Natural History and Ethnology belonging to the United States and constituting the National Museum, of which the Smithsonian Institution was placed in charge by the act of Congress of August 10, 1846.

It has been prepared at the request of the Institution, and printed by authority of the honorable Secretary of the Interior.

JOSEPH HENRY,
Secretary Smithsonian Institution.

SMITHSONIAN INSTITUTION,
Washington, November, 1875.

PREFACE.

The writer of the following notes has no pretension to the title of "naturalist", and deprecates criticism of any technical errors that may be found in his descriptions of the species.

He wishes to acknowledge the kind courtesy of Dr. Elliott Coues, U. S. A., who has undertaken to edit these notes, and has encouraged him to offer them for publication.

J. H. K.

BROOKLYN, N. Y., *July* 1, 1875.

INTRODUCTORY.

The various parties which had been organized for observing the transit of Venus in the southern hemisphere, five in all, were dispatched from New York on the 8th of June, 1874, in the United States ship Swatara (3d rate).

After short stoppages at Bahia and Cape Town, and an unsuccessful attempt to land a party on one of the Crozet Islands, the party to which the writer was attached was landed at the upper (northern) end of Royal Sound, a deep indentation in the southern part of Kerguelen Island, otherwise known as "Desolation Island." The landing was begun on September 10, and on the 13th the Swatara sailed again on her easterly course, having put up a sufficiently commodious living hut before her departure.

The party landed consisted of Commander Ryan and Lieut. Commander Train, astronomers, and Dr. Kidder, surgeon, all of the Navy; and Messrs. Holmes, Dryer, and Stanley, photographers. Besides these, there were a cook and carpenter belonging to the party, and three boys, stowaways from Cape Town, afterward turned over to the British man-of-war.

The preparation and registration of specimens was at first carried on in a small tent, to the great detriment both of the specimens and of the health of the collector, owing to the extraordinary dampness of the climate. Toward the end of October, a hut about ten feet square was erected, and a small stove set up, after which no more specimens were lost through insufficient drying.

Kerguelen's Island is a region of almost constant precipitation; only twenty-seven days out of four months being recorded as without snow or rain, and a still smaller number of nights. The thermometer ranged not far from the freezing-point; the daily average being a little below it in September and October, and a little above it in November and December. Whalers say that in midwinter there is no marked increase in the severity of the weather. The lowest thermometer recorded was 18° F., and the highest 64°. The island is also deservedly notorious for the violence of the gales, which almost constantly prevail, and which

[illegible] with a suddenness that makes it very dangerous to go [illegible] boats.

[illegible] climatic conditions have their natural effect upon the flora [illegible] the island; there being neither tree nor shrub—no plant, in fact, [illegible] the Kerguelen cabbage, while the very few species of flowering plants which do survive are such only as can thrive exposed to sudden and violent alternations of dryness and moisture and to [illegible] wind. As a natural consequence of these facts, there are [illegible] mammals, strictly speaking, indigenous to Kerguelen [illegible] but a single shore-bird (*Chionis minor*).

The island is of considerable size, about 90 miles long by 50 in width, [illegible] composed, as to its southern part at least, wholly of volcanic [illegible] showing no signs of stratification. The northern portion contains [illegible] rocks, deposits of coal of little value, and very ancient remains of [illegible] fossil wood, indicating the former existence of considerable forests [illegible] the submergence and subsequent upheaval of the land upon which they grew. The whalers say that a large glacier runs across the island in a [illegible] generally east and west direction, at about its center. In the [illegible] land is mountainous; peaks with sharp volcanic outlines alternating with table-topped hills. Mount Ross, the highest peak (about [illegible] feet), is always snow-covered and quite inaccessible. Near the [illegible] in December, the snow-line was found on Mount Crozier at about [illegible] feet above the sea-level.

No flying insects were observed excepting minute gnats, and a Tipula [illegible] which was perhaps imported), nor were the remains of any found in the stomach of any bird. *Chionis* and a teal were the only [illegible] vegetable feeders observed; all the other birds feeding exclusively on flesh, fish, or marine invertebrates.

Early in the middle of October, an English party, to observe the transit [illegible] established itself about fourteen miles to the southward and westward [illegible] the American station, including a naturalist, the Rev. A. E. Eaton, [illegible] already known to science by his botanical collections in Spitzbergen. [illegible] accompanying this party were two men-of-war, which remained by them [illegible] during their stay. On the other side, at about the same distance to the [illegible] southwest, was a German party, landed from the N. G. frigate Gazelle, [illegible] and to which Drs. Naumann and Huesker were attached as naturalists. [illegible] The Gazelle was engaged in a scientific cruise throughout the south

[illegible] the same as described by Rev. A. E. Eaton as *Embryonopsis Halticei* [illegible] Mag., July, 1875.

waters; being fitted for deep-sea dredging and general natural history work. A large room was set apart, on the starboard side of the gun-deck, for the use of the naturalists—a very unusual concession to science on a man-of-war.

On the 9th of December, the day of the transit, and fully three months before the Swatara could reasonably be looked for back again, the Monongahela arrived most unexpectedly, having been ordered to take the party off. Fortunately for the natural-history work, the astronomers detained the ship until January 11; but it is greatly to be regretted that the original programme was not carried out, and that the months of January and February were lost in so interesting a locality. Both the English and German parties remained at their stations, intending not to leave until about the middle of February. The Monongahela proceeded to Cape Town, arriving February 5, and the collections were sent thence by sailing-bark to New York.

According to Dr. Coues' determinations, the collection contains twenty-one species of six families—*Procellariidæ* eleven, *Spheniscidæ* four, *Laridæ* three, *Phalacrocoracidæ*, *Anatidæ*, *Chionididæ*, each, one.

BIRDS OF KERGUELEN ISLAND.

CHIONIS MINOR, *Hartl.*

LESSER SHEATH-BILL.—"WHITE PADDY" *of whalers.*

Chionis minor, HARTLAUB, Rev. Zool. 1842, pl. 2, f. 2.
GRAY & MITCH., Gen. of B. iii, 1849, pl. 136.
SCHLEGEL, Handl. Dierk. pl. 5; De Dier. fig. p. 232.

List of specimens, with measurements.

Smithsonian Institution number.	Original number.	Date.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Tarsus.	Middle toe.	Longest claw.	Remarks.
		1874.											
49936	27	Oct. 12	♂	15.50	30.50	9.00	.....	1.50	1.35	2.00	1.85	0.50	Skin.
49937	31	Oct. 16	♀	14.00	29.00	8.50	.....	1.35	1.65	1.85	1.60	0.45	Do.
49935	32	Oct. 16	♂	15.00	31.00	9.50	.....	1.50	1.60	1.80	1.60	.....	Skin with sternum.
.....	33	Oct. 18	♂	.....	.....	.....	.....	.....	.....	.....	.....	.....	Disemboweled and in alcohol.
49938	67	Nov. 14	♂	15.75	32.00	9.35	.....	1.50	1.75	1.75	1.60	0.40	Skin.
.....	127	Dec. 5	♂ (?)	15.00	30.00	9.00	4.65	1.45	.....	1.65	1.55	0.50	Alcohol.
.....	146	Dec. 11	♂ (?)	14.50	29.00	8.50	.....	.....	.....	1.75	1.50	0.50	Do.
.....	203	Dec. 29	♂ (?)	16.50	30.50	9.00	4.85	1.50	.....	1.85	1.75	0.50	Alcohol and carbolic acid.
.....	204	Dec. 29	♀ (?)	15.25	29.15	8.85	4.50	1.35	1.65	1.75	1.65	0.50	Do.
.....	205	Dec. 29	♂ (?)	15.50	29.85	8.85	4.75	1.35	1.65	1.75	1.55	0.45	Do.
.....	206	Dec. 29	♀ (?)	15.75	28.85	8.50	4.75	1.35	1.75	1.75	1.65	0.50	Do.
.....	232	1875. Jan. 4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Sternum of No. 32.

Bill black and conical. On its upper surface a hood-shaped horny sheath, turned upward at its extremity, and not at all "erectile" so far as my observation extends (see Cuvier, An. King., *Chionis necrophaga*). This sheath measures from 0.45 to 0.85 in different individuals, being rather larger in the male than in the female. The nostrils are separate and of large aperture.

Eyelids pale-pink, whence the *Chionis* is often called by the sealers the "sore-eyed pigeon". A black caruncle extends from the base of the sheath upward to the front of the eye, both in males and females; more prominent in the former, and especially after the birds have paired.

Iris purplish-black.

Body entirely pure white. A scaly, black, blunt spine projects from the carpal joint of the wing (in the male) 0.35 to 0.40. In the female, this spur is represented only by a small knob, which is flesh-colored.

... and light. Underlying the white plumage is a ... down, similar to that usually found on sea-birds. ... bill, with a flesh-tint; scaly and stout. Toes 4: ... placed above and on the inner side of the tarsus. ... light, nearly square.

... and of small size so late as November 14.

... fragments of sea-weed and beaks of cephalopods.

... No. 67 (original number) measured 29 inches and ... There is a distinct crop and muscular gizzard; ... of the small intestine beyond the pylorus, as ... the stomach into two portions, one muscular and the ... gizzard internally rugose.

... as large as those of a guinea-fowl, and marked with ... Three were found in the only nest of which I have reli- ... and these were marked in different shades (*auct.* Rev. ... last to English transit-party).

... was one of the first birds observed after landing at Ker- ... on the way up from the Swatara's first anchorage to ... selected, one of these birds alighted on the boat hoisted ... the ship, and remained there for a considerable time, ... of the persons standing upon the poop, and seemingly ... their movements. One of the first specimens taken ... by hand, by Mr. Russell, of the New Zealand party: he ... the bird near to him by means of a dead one, killed with ...

... quite common in particular parts of the island, near the ... station, especially in the neighborhood of the "rookeries" of ... (*Pygoscelis carinicaudus*) and of the rock-hopper penguins ... *chrysocome*), and upon rocks at and near high-water mark. ... times, I have often observed them for hours at a time; their ... tameness and curiosity rendering it easy to get near them. ... 4th of October, for example, seeing a considerable number on ... at some distance away, I walked and climbed slowly toward ... They would scarcely get out of my way, seeming greatly inter- ... my movements, and when I sat on a stone, keeping perfectly ... the whole party, twelve in all, came up to examine the intruder. ... walked all around me, coming almost within reach; others flying ... from more distant rocks to join them, and finally stopped, almost in ... for a good stare. I watched them at these close quarters

for an hour or more, and saw no sign of any power of erecting the horny sheath, attributed to them by Cuvier. They run with great rapidity upon the rocks, avoiding the little pools left by the tide, and seem disinclined to flight. When flying, they have a peculiar note, strongly suggestive of the "chat" of the common blackbird. The call at rest is a short rattling croak. I could not see that they ate or sought for any other food than a soft green sea-weed, which they stripped up with their bills, shaking the water out with a rapid flirting motion. I have, however, found in their stomachs the beaks of cephalopods, together with vegetable matter; and some that we afterward partially domesticated ate greedily of fresh meat. One that was kept for some time on the Monongahela showed a strong *penchant* for eggs, breaking the shells with its beak as if the operation were no novelty to it. On no occasion, however, did I observe any sign of the carrion-feeding propensity which has given a name to the Australian species (*C. necrophaga*, Vieill.). On the evening of December 14, after skinning a sea-elephant, I went down at dusk to watch some other birds feeding on its carcass, already beginning to putrefy. A *Chionis* flew by, alighted near at hand, and, after a short time, moved on without going up to the carcass, although the latter was nearly covered with sea-birds.

On the occasion first mentioned, after watching the birds for a time, I shot four specimens, not without compunction on account of killing such trustful acquaintances. When I walked off to get a sufficient distance away for a shot, the whole troop started to follow me, making little runs and stopping, as if filled with curiosity. I shot all four without moving from the spot, reloading for each, the birds not all flying out of range even after the gun had been fired. On subsequent occasions, various members of the party captured specimens by hand; all that was necessary to attract them within reach being to remain perfectly still. After one had been caught, it served as a lure for others. When taken home alive, they still showed no fear, but, when let loose in the house, took food readily, and, oddly enough, fought fiercely among themselves, using only their bills, however, and not the wing-spurs. None of us ever saw them fighting in the open air. When confined in a coop, they cluck and peck at the wood-work so like domestic fowls that I once arose in the night to shut the kitchen-door, supposing that the chickens, of which we had several, had come into the house. Although seemingly absolutely without fear, the specimens that we tried to domesticate bore confinement very illy, constantly beating themselves, during the day, against the

bars of their cage. When let loose, they would often stay for several days near the house, feeding as peaceably among the chickens as tame pigeons. One, whose wing had been clipped, remained about the house for some weeks, but finally wandered off, and was probably killed by a *Lestris*, since I found its carcass, partly devoured, about a mile from the house.

Opinions differed as to their edibleness; the Germans considering them the best bird on the island, while the whalers said that they would "do very well when very short of fresh meat". We did not experiment upon them at all, the flesh being dark and apparently tough.

The *Chionis* is one of the latest, if not the very latest, of the Kerguelen birds in pairing and nesting. They were observed to have begun to pair December 11; but no egg was found until January 10, the day of our departure, when the Rev. Mr. Eaton found several nests. To his courtesy I am indebted for my only specimen, unfortunately not accompanied by any description of the nest, except a message that it was found near the sea. From Captain Fuller, of the whaling-schooner Roswell King, however, I learn that the Sheath-bill is famous for its skill in concealing its nest, never going near its eggs while any one is in sight. He states that they build in the crevices formed by rocks that have fallen upon or against one another, and that the nests are constructed of dried grass. There were three eggs in the nest from which my specimen came, marked in different shades of color. I am quite positive that, up to January 5, none of the *Chionis* living near our station had begun to lay, since I kept them under the closest possible observation, being particularly anxious to get their eggs. The eggs are of unusually large size in proportion to that of the bird.

QUERQUEDULA EATONI, *Sharpe*.

Eaton's Teal.

Querquedula eatoni, Sharpe, Ibis, July, 1875, p. 328 (quoted from advance sheets).

I was entirely at a loss for a name for this teal; but, just as these sheets were going to press, I received, through the courtesy of Mr. Salvin, advance proof-sheets of the "Ibis", in which it is described as new. Mr. Sharpe's description is reproduced in the accompanying foot-note.*

* "♂. suprà brunneus, plumis plurimis griseo marginatis, rufescenti-fulvo maculatis aut fasciatis: scapularibus nigricantioribus: pileo paullo rufescentiore plumis nigro medialiter striatis; facie laterali et gutture albicantibus, minutè nigro striolatis, mento fulvescenti-albo: corpore reliquo subtùs albicante, brunneo marmorato, plumis plerisque pectoralibus versùs basin griseo-brunneis aut medialiter brunneo striatis: hypochondriis brunneis, albido terminatis et rufescenti-fulvo transfasciatis: subcaudalibus rufescenti-fulvis, nigro adumbratis, longioribus nigricantibus fulvo terminatis; tectricibus alarum

A rather small duck, the sexes of which differ but little (chiefly in the vividness of the alar speculum). Head and neck minutely speckled with blackish-brown and light-brown or brownish-white—the top of the head darkest, the sides of the head, the neck, and especially throat lightest. Upper parts brownish-black; all the feathers broadly skirted with rusty-brown and pale-gray. Under parts dull whitish, mottled throughout with brown, more uniform and of a richer shade on the breast, in larger pattern on the sides and crissum. Axillars white, with dark-brown cross-bars; lining of wings dark-brown, with paler or white edgings of the feathers. Wing-coverts plain grayish-brown, or, in the ♀, with narrow rusty-brown edgings; the greater row of coverts tipped with orange-brown, paler or whitish in the ♀. Speculum iridescent green, with purplish and violet reflections, immediately bordered with black, this in turn margined with white on the ends of the secondary quills. In the ♀, the green speculum is dull, and tinged with brown. Primaries fuscous-brown; tail-feathers the same, with pale edges, and irregular oblique rusty-brown markings, like broken V-shaped bars. The tail-feathers are all lanceolate-acuminate, and the tail as a whole is acute.—C.

List of specimens, with measurements.

Smithsonian Institution number.	Original number.	Date.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Tarsus.	Longest toe.	Middle claw.	Remarks.
		1874.											
6974	34	Oct. 18	♀	15.60	27.00	8.50	4.50	1.35	1.85	1.35	1.50	0.25	Skin; stomach contained isopods.
6977	68	Nov. 15	♂	17.25	29.50	9.10	5.50	1.50	2.00	1.50	1.60	0.25	Skin; stomach contained gravel and isopods.
6975	207	Dec. 29	♂	19.05	29.75	9.10	5.25	1.50	1.85	1.35	1.50	0.35	Skin; stomach contained gravel only.

Bill lamellate, greenish-gray at sides, black at tip and above, covered with skin, and finely toothed within. Tongue fleshy, toothed on posterior half of dorsal surface.

Nostrils oval.

Iris purplish-black.

Head and *neck* brown, finely mottled with white, lighter over throat. In some males, the mottling varies, being finer and lighter, with green reflections at sides of head.

Plumage generally dark-brown or black, tipped with white and mottled with paler shades of brown. Secondaries and tertiaries of wings edged with a narrow white band. Above this, in the male, is a band

superioribus cinerascenti-brunneis, majoribus pallidè badio terminatis, fasciam alarem formantibus; remigibus cinerascenti-brunneis, secundariis extùs purpureo bronzinis albidoterminatis, speculum alarem bronzinum vix sub certâ luce olivascente nitentem exhibentibus: secundario proximo nigricante vel aspectu externo viride nitente, medialiter cinerascente strigato, albo apicato: secundariis interioribus nigricantibus extùs pallidè brunnescentibus albo limbatis: rectricibus mediis nigricantibus, reliquis brunneis albo marginatis, nonnullis rufescenti-fulvo notatis: tectricibus subalaribus brunneis, inferioribus intimis et axillaribus albis brunneo maculatis, tectricibus majoribus cinerascenti-

one inch wide of lustrous changeable green, then a band of orange-brown one-fourth inch wide.

Tarsus and *foot* ocher-yellow to dirty pale-green.

Claws black; posterior nail very short and much elevated; the other three covered by skin beneath to their extremities.

Tail pointed.

Stomach is muscular and generally contains gravel.

These birds, which became the principal dependence of our party in the way of fresh provisions, are very abundant on the island, but generally shy and difficult of approach. They were to be found inland, where I have seen them as high as 2,500 feet above the sea-level, and on the sea-shore when the tide was falling. They feed upon the roots of the *Azorella selago*, grass-seeds, earth-worms, and larvæ, and the small crustaceans which swarm along the sea-shore. They are strong in flight, rising readily from both land and water, and run upon the land like grouse or quails, with little of the clumsiness or waddling gait of other ducks.

It is probable that they begin to pair about November 10, since I observed pairs already formed, and the birds chasing one another in the air, etc., on November 14. They frequent the banks of brooks and the higher land during the breeding-season, and begin to lay about November 15, building a rather deep nest on the ground, generally near the water, under a tussock, and well concealed by grass, deep, hemispherical, and lined with feathers from the breast of the female. There are four or five pale olive-green eggs, about three-fourths the size of a hen's egg. Upon leaving the nest, the female covers her eggs with feathers, disposing the neighboring grass with considerable art so as to conceal

bus alæ inferiori concoloribus; rostro plumbeo, culmine nigro: pedibus cinerascentibus, membranis interdigitalibus nigris. Long. tot. 15.5, alæ 8.5, caudæ 4.8, tarsi 1.2.

"♀. mari similis sed speculo alari absente, secundariis albo terminatis: caudâ brunneâ, rufescenti-fulvo fasciatim marmoratâ.

"*Hab.* in insulâ Kerguelensi.

"This plain-coloured Teal is allied to *Q. gibberifrons* and *Q. creccoides*. From the former it is at once to be distinguished by the fawn-coloured bar on the wing and the bronzy speculum, the wing-bar being broadly white, and the speculum black in *Q. gibberifrons*.

"*Q. creccoides* resembles *Q. eatoni* in having the fawn-coloured wing-bar; but then the speculum is black, and the greater part of the bill is yellow.

"*Q. eatoni* also has the axillaries whitish barred with brown, whereas they are quite *white* in the allied species, and, moreover, it has remains of rufous-buff bars on most of the feathers of the upper surface, the back being uniform in the other species. Altogether the species seems very well pronounced. Besides the three examples brought by Mr. Eaton, I have found in the [British] Museum three Kerguelen Island skins, collected during the voyage of the 'Erebus' and 'Terror.'"

them, and if caught in the act of sitting, or near her nest, will often counterfeit lameness until the intruder has been enticed to a safe distance. If the drake be shot during the pairing-season, the female will remain near the body; when the female falls, on the contrary, the drake generally flies merrily away. The note of the female is a plaintive whistle; that of the drake a sonorous "quack", usually repeated three times.

These birds do not migrate at all from Kerguelen Island, nor is there any other member of the family *Anatidæ* there represented. They are very palatable, and, since we never shot more at a time than were actually needed, served us for the table during the whole time of our stay.

GRACULUS CARUNCULATUS (*Gm.*).

CARUNCLED CORMORANT.—"SHAG."

Pelecanus caruculatus, GMELIN, Syst. Nat. i, 1788, p. 576, No. 25 (based on the Caruculated Shag, LATH., Syn. iii, 2, p. 603, No. 19).

Pelecanus cirrhatus, GMELIN, Syst. Nat. i, 1788, p. 576, No. 28 (based on the Tufted Shag, LATH., Syn. iii, 2, p. 606, No. 22).

I have no hesitation in identifying this species as above, although the single adult specimen collected does not show the white transalar fascia spoken of by authors. Schlegel, moreover, quotes it from the present locality. The caruncles, which are conspicuous features of the adult breeding bird, constitute two prominent yellow masses symmetrically disposed on the naked forehead at each side of the base of the upper mandible. The head and neck are lustrous, deep steel-blue, with purplish and violet reflections, contrasting notably with the rich dark-green back, the color of which is uniform, the feathers having no differently-colored edges. The entire under parts, from the bill, on a line along each side of the neck, are pure white.—C.

List of specimens, with measurements.

Smithsonian Institution number.	Original number.	Date.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Tarsus.	Longest toe.	Middle claw.	Remarks.
		1874.											
52978	20	Sept. 25	♀	23.50	40.00	10.00	5.50	1.75	3.50	2.00	3.35	0.35	Skin.
.....	118	Dec. 4	....	5.00	4.00	.....	.....	.....	.....	.....	.....	.....	Young; alcohol.
.....	191	Dec. 24	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.
.....	192	Dec. 24	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.
.....	193	Dec. 24	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.

Bill black; upper mandible sharply hooked; lower straight. Nostrils 2, extending nearly to point of bill. Caruncles at base of bill brilliant yellow. Eyelid cobalt-blue.

Iris yellow.

Head and *body* brilliant changeable steel-blue, with violet tints along back of head and neck. Back and upper surfaces of wings and tail lustrous dark-green. Throat from the bill and all under parts, pure white. During the breeding-season, the bird carries an erectile crest of about a dozen small plumes upon the top of the head.

Tarsus and *foot* yellow.

The foregoing description is taken from a female in breeding-plumage.

Eggs two or three in number, pale-green.

Young perfectly naked for some time after hatching, black, and showing no sign of plumage. Bill black. Feet clumsy and misshapen; bones still cartilaginous, pale, and transparent. Abdomen very protuberant. December 24, a young bird had begun to show a hairy sort of plumage along the margins of the wings and about the rump.

Only a single adult skin of this cormorant was preserved and brought home, a female in nuptial plumage. There is no better reason, I am afraid, for this omission than the fact that the birds were exceedingly plentiful and the preparation of the skins a very tedious job, so that it was put off from day to day for rarer specimens, until, in the hurry of an unexpectedly early departure, it was omitted altogether. From memory, I can only say that the young birds were of much more sober plumage than the females, destitute of the crest and brilliant blue eyelid, and generally rather smaller. All had white breasts and bellies; but there were many minor variations in plumage, which I suppose to indicate differences in age.

They do not differ materially in habits from other species of cormorant, diving and swimming well, feeding entirely on fish, and often congregating for hours upon a projecting rock or headland, where, in pairing-time, they enact various absurd performances, billing and curveting about one another in a very ridiculous manner. The note is a hoarse croak, which never varies, so far as I have observed. They seem to be on particularly good terms with the *Chionis*, and are often joined by gulls when sunning themselves.

They build upon shelves, for the most part in the precipitous faces of cliffs overlooking the water; the base of the nest being raised sometimes as much as two feet, and composed of mingled mud and excrement. Upon this pedestal is constructed a rather artistic nest of long blades of grass. Apparently, they continue to use the old nests year after year, adding a new layer each season, and thus building the nest

up. The first eggs were found November 5; there being sometimes two and sometimes three in a nest. They were procured at first by the kind assistance of Mr. Stanley, and a length of rope which tied us together, one end being knotted around the waist of each. One would then remain above and hold on, while the other clambered a little way down the face of the cliff and secured the eggs. After a time, however, I discovered a lot of nests, near a rookery of "rock-hopper" penguins, accessible from below, where, on December 4, the young birds were first observed. Eggs green, with white chalky incrustation.

The young are most ridiculous-looking objects, being pot-bellied, naked, and perfectly black, and seem to be less advanced in development at the time of hatching than most birds, the bones of the tarsus and foot being not yet ossified. Small fish were generally lying by the nests. The old birds were very solicitous about their young, hissing and stretching out their necks, and refusing to leave their nests until pushed off. Yet, when I took one of the young away from the nest and placed it close by on the rock, the mother seemed neither to recognize its constant chirping nor to be aware that one of her brood was missing. Certainly she paid no attention to it. The odor in the neighborhood of the nesting-places was most offensive.

The young birds are infested with a tick of prodigious size, specimens of which have been preserved.

BUPHAGUS SKUA ANTARCTICUS, (*Less.*) *Coues.*

SOUTHERN SKUA.—"SEA-HEN."

Lestris catarractes, QUOY & GAIMARD, Voy. Uran. Ois. pl. 38.
Stercorarius catarractes, p., SCHLEGEL, Mus. Pays-Bas, fasc. iv, 1863, *Lari*, p. 45.
Lestris antarcticus, LESSON, Traité d'Ornith. 1831, p. 616.
GOULD, B. Aust. vii, pl. 21.
SCLATER, Proc. Zool. Soc. 1860, p. 390.
ABBOTT, Ibis, 1861, p. 165.
SCLATER & SALVIN, Ibis, 1869, 284.
SCLATER & SALVIN, Proc. Zool. Soc. 1871, 579.
PHILIPPI & LANDBECK, Cat. Av. Chili, p. 47.
HUTTON, Birds New Zeal. 1871, p. 39.
Stercorarius antarcticus, BONAPARTE, Consp. Av. ii, 1856, p. 207.
PELZELN, Orn. Novara Reise, p. 150.
Buphagus antarcticus, COUES, Proc. Acad. Nat. Sci. Phila. 1863, p. 127.
Buphagus skua b. *antarcticus*, COUES, Birds Northwest, 1874, p. 605.

—C.

List of specimens, with measurements.

Smithsonian Institution number.	Original number.	Date.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Tarsus.	Middle toe.	Longest claw.	Remarks.
		1874.											
68960	26	Oct. 4	♀	.....	54.00	.....	.....	2.50	4.00	3.00	.....	.....	Skin (from Mr. Stanley).
68959	42	Oct. 27	♂	24.00	54.00	16.00	7.25	2.25	3.15	3.00	2.85	0.65	Skin.
.....	139	Dec. 10	...	25.50	58.50	17.25	7.35	2.35	3.25	2.65	3.00	0.75	Alcohol, with eggs.
68961	188	Dec. 24	♀	23.75	54.00	15.50	6.35	2.35	3.15	2.85	2.65	0.75	Skin with eggs.
	262	Dec. 19	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	Specimen injected with carbolic acid.

Bill black.

Iris very dark steel-blue.

Body generally dark-brown, mottled with black; basal parts of primaries showing as a broad white band beneath the wings during flight. Back sparingly mottled with dirty white. A single white feather often found near and below carpal joint of wing, among the coverts. Second primary longest. Considerable differences in general tint were observed, even in the same pair, some being very much paler than others. Stomach muscular; contents not identified, except in one case, when bits of egg-shell were found.

Tarsus and *foot* greenish slaty-black, scutellated. Claws black, long, and strongly hooked.

There being no land-birds on Kerguelen Island besides *Chionis*, the office and most of the habits of a buzzard-hawk have been assumed by this great skua. It was at first taken for a hawk by all of us; its manner of flight, watchfulness of the ground over which it flew, and habit of perching on spots commanding a wide view all suggesting this impression. It was, indeed, difficult to believe the evidence of my own senses when I found a web-footed bird avoiding the water and preying solely, so far as my observation extended, upon other birds. When any of the party went out shooting, he was pretty sure to be followed by one or two "sea-hens", as the sealers call them, and had often to be very prompt to secure his game before it should be carried off in his very presence. Mr. Train tells me that he had one day to stand, while reloading, with his foot upon a teal which he had shot, a skua swooping down constantly after it if he stepped away even for a couple of yards. On another occasion (October 21), the same gentleman had crippled a teal, which was carried off, still living and not badly hurt, before his

eyes, so that he had to shoot the skua to secure his game. November 21, in order to settle the question whether they attack and kill their own game when it is unhurt, Mr. Stanley and I dug up, by the aid of the dog, a well-grown and nearly-fledged young bird (supposed to be of *Majaqueus æquinoctialis*), as large as an ordinary domestic fowl. A pair of skuas being near at hand, watching our proceedings, I threw the young bird up into the air, so that it flew some distance and alighted perhaps two hundred yards away from us. One of the skuas immediately flew up to it, and killed it by repeated blows upon the head with its beak; the other remaining at some distance, on guard, as I at first thought, but, as afterward appeared, afraid of its mate; for, while we stood watching the first skua eating its capture (nearly as large as itself), the other approached by degrees, uttering short, plaintive chirps, but not daring to share in the meal. When, after a few minutes, we drove them off, the abdomen of the petrel had been torn open, and its entrails partly devoured. I could not see that its claws were used in tearing its prey; it seeming rather to depend upon the strength of its beak. On another occasion (December 18), a fully-grown *Majaqueus*, sitting, which had been dug up and probably slightly bruised by the dog, alighted in the sea after a short flight, and was at once fiercely attacked by a skua. The petrel showed extreme fear, uttering piercing shrill cries, and turning over to fight at each swoop, but finally took wing again and escaped.

I saw this skua on one occasion feeding amicably with the gulls astern of the ship when at anchor (December 28); and, on January 18 one was seen flying about the Monongahela for a few minutes, she being then about three hundred miles from the nearest land. As a general rule, its habits are terrestrial, and on the few occasions when, probably after poor success in hunting, I have seen it alight in the water, it has held its wings up perpendicularly, like a butterfly, as if afraid of wetting them. At the pairing-season, this trick of holding up the wings becomes quite a prominent characteristic. Two will alight upon a knoll, quite near together, holding their wings perpendicularly in the air, and set up a vociferous cackling. The note is loud, harsh, and hoarse, suggestive of the cry of the gull.

I have never seen *Buphagus* pursue gulls to make them disgorge their food. On the contrary, both gulls and terns combine to drive them away as soon as they come into their neighborhood, particularly while nesting. I even on one occasion saw a single gull driving a skua away from the neighborhood of its nest. On the 15th of October, I shot and wing-

tipped one of these birds so that it fell into the water. It seeme unusually alarmed, looking up into the air, crying out hoarsely with note unlike its usual call, and swimming very slowly for a web-foote bird. The great number of gulls which collected at once and began t attack it explained its fright, and it seemed to suffer so greatly that fired into it again after a few minutes, and spoiled my specimen. It noteworthy that, whereas other sea-birds when wounded invariably swi out to sea, this one endeavored to gain the land, plainly looking in th direction for safety, although I stood upon the shore, directly in i way.

Eggs were first found November 17, two in number, marked by irre ular chocolate-colored blotches upon an olive-drab ground, and measurin 2.75–3.00 by 1.50 inches. The nest is a shallow cavity in the long gra (*Festuca*), lined sparingly with grass-stems, and always in a dry spot. Th old birds make it very lively for the egg-hunter, attacking him on opp site sides with great vigor and determination, and keeping up an outer that is really appalling. They are very skillful in leading one astra from the locality of their nests, never going near it when any one is i sight, so that it was a good while before I found the second nest, althoug I had spent more time in this quest than in pursuit of any other sing object while on the island. Seeing a skua fly by the house one da (December 7), apparently going somewhere in a great hurry, I therefor snatched up a revolver (no gun being at hand) and followed him. H was going to join the female on her nest, as I suspected, and when approached both attacked me as usual. I succeeded in killing the mal but emptied the revolver at the female without success, and was kep standing for certainly twenty minutes, pelting the enraged bird wit stones as she swooped down at my head, with the two eggs in pla sight, but not daring to pick them up. A lucky throw finally disable her, and I secured the eggs, which were very much paler than thos gathered theretofore, and quite fresh. I suppose that this pair had bee so often disturbed by our near neighborhood that they were later tha usual in laying.

It would seem that these birds pair once for all, since a single coup holds possession of each meadow-district, allowing no intruders; an since two were almost always seen together during our stay. An od bird, whose mate had probably been shot, and which had a ragge wing from some stray charge of small shot, used to circulate aroun from district to district, being always attacked by both male and femal as soon as seen. On the 20th December, however, I saw seven nea

together in one meadow. On the same day, I found a single egg in a nest which I had robbed December 3. I did not succeed in finding the young, but heard of a pair being seen on December 26.

I cannot say how far the habits of "*Lestris catarrhactes*," the northern representative of this bird, agree with what has been related of *Buphagus*. The latter certainly seems to me a remarkable instance of modification of habit, and even of form, resulting from the peculiar circumstances in which it is placed. As among marsupials, where that type prevails, we find representatives of almost every tribe of mammals, so here there is a sea-bird occupying the place of a tribe as far removed from it structurally as the Tasmanian devil is from the fox. I should think it even probable that the introduction of a few pairs of hawks, could they accommodate themselves to the conditions of the island, would relegate this skua very shortly to its proper place as a fish-feeder, and to the habits of its northern congeners.

A very interesting incident, although not directly related to its natural history, occurred in connection with one of these birds on December 17. On that day I scored one on the back of the head with a revolver-bullet so as to open the brain-cavity. It turned back-summersaults for twenty minutes without cessation, until I killed it, in fact. No matter what position it was put in, it immediately stretched out its legs and wings, and pushed itself over backward. Placed in the water, it endeavored to execute the same manœuvre, and was near working itself out of reach from the shore. The specimen was injected with carbolic acid and preserved. The corresponding effect, that resulting from a wound of the cerebrum only, was at another time illustrated in a gull (see *Larus*), and both incidents recalled strikingly Dr. Weir Mitchell's interesting experiments, performed some ten years ago upon pigeons.

LARUS DOMINICANUS, *Vieill.*

SOUTHERN BLACK-BACKED GULL.

Larus dominicanus, "VIEILLOT".—LICHTENSTEIN, Verz. Doubl. Mus. Berol. No. 846.
BLASIUS, J. f. O. 1865 (pub. 1866), p. 378.
Larus azaræ, "LESSON, ex Azara 409".
Dominicanus azaræ, BONAPARTE, Consp. Av. ii, 1856, p. 214.
Dominicanus vociferus, BRUCH, J. f. O. 1853, p. 100; 1855, p. 281.
Dominicanus pelagicus, BRUCH, J. f. O. 1853, p. 100, pl. 2, f. 3; 1855, p. 280.
BONAPARTE, Consp. Av. ii, 1856, p. 214.
Larus vetula, "BAILLON".
Dominicanus vetula, BRUCH, J. f. O. 1853, p. 100, pl. 2, f. 4; 1855, p. 281.
BONAPARTE, Consp. Av. ii, 1856, p. 214.
Dominicanus fritzei, BRUCH, J. f. O. 1855, p. 280 (*L. fuscus*, Fritze).
BONAPARTE, Consp. Av. ii, 1856, p. 214.

Larus antipodum, GRAY.
Dominicanus antipodum, BRUCH, J. f. O. 1853, p. 100, pl. 2, f. 8; 1855, p. 281.
BONAPARTE, Consp. Av. ii, 1856, p. 214.
Clupeilarus antipodum, BONAPARTE.
Larus verreauxi, BONAPARTE, Rev. Zool. 1854, p. 7; Naum. 1854, p. 211.
Dominicanus verreauxi, BRUCH, J. f. O. 1855, p. 281.
Clupeilarus verreauxi, BONAPARTE, Consp. Av. ii, 1856, p. 221.
Larus capensis, "SMITH, MSS." (*Gray.*)
Larus fuscus, "FRITZE". (*Gray.*)
Larus littoralis, "FORSTER". (*Gray.*)
Larus antarcticus, "ELLMAN". (*Gray.*)

The bird from Kerguelen's Land appears to be the particular style of southern b backed gull to which the term *antipodum* has been applied. The bill is very he as Bonaparte says, "rostro crassissimo fere gabianum simulante". But I have no whatever in the specific distinctions which Bonaparte, Bruch, and others have s to establish among these forms, and do not hesitate to bring them all under one following Schlegel and Blasius.—C.

List of specimens, with measurements.

Smithsonian Institution number.	Original number.	Date.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Tarsus.	Middle toe.	Longest claw.	Remarks
		1874.											
68965	25	Sept. 29	♀	23.00	49.00	15.25	7.00	1.85	2.85	2.75	2.00	0.40	Skin; adult.
68964	58	Nov. 7	...	22.75	50.05	15.00	8.00	1.75	.....	2.40	2.15	0.40	Skin; young; to identify s
68966	83	Nov. 18	♀	22.50	51.50	16.00	7.80	1.50	2.40	2.25	2.20	0.40	Skin; adult.
68967	84	Nov. 21	♀	22.40	49.25	15.10	6.50	1.60	2.50	2.25	2.00	0.35	Skin; young.
	103	Nov. 26	♂	23.75	54.50	16.00	6.60	1.65	2.60	2.60	2.25	0.30	Skin; adult.
68968	156	Dec. 14	♀	22.00	53.00	15.00	6.75	1.60	2.80	2.50	2.10	0.30	Skin; young.
		1875.											
....	219	Jan. 2	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	Young; alcoh
....	220	Jan. 2	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.
....	221	Jan. 2	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.

Bill, adult, saffron-yellow; a red spot at the eminentia sympl Young (No. 58) black, with a white spot over nostrils; line of symp of lower mandible white; (84) pale-pellow, irregularly streaked black, *black* spot on pyramidal portion of lower mandible; (156) ye streaked with black, *no* spot on lower mandible. The measuren are of the "chord of the culmen." From the gape, the bill mea from 2.25 to 2.70 inches.

Iris, adult, mustard-yellow. Young (Nos. 58 and 156) brown-g (84) bright-yellow.

Head, adult, white; eyelid coral to deep orange-red. Young, and neck brown, more or less mottled with white; eyelid (No. 84) boge.

Body, adult, back and wings slaty-black, excepting a band of w about one inch, at ends of primaries and secondaries; primaries the usual *pictura*; neck, breast, belly, tail, and under parts of w

pure white. Young generally brown, mottled with black and white. Tail of No. 58 shows a black band at tip, while that of No. 156 is tipped very narrowly with white. The intermediate specimens have the white tips of primaries in various approximations to adult plumage.

Tarsus and *foot*, adult, yellow, with a greenish tint posteriorly. Young pale-gray (156), yellowish-gray (84), or ash-colored (58), the scutellated line being darker than the rest.

Claw black.

Stomach muscular, containing remains of shell-fish.

Young (unfledged) reddish-brown, mottled with black.

Eggs three in number, olive-green, mottled with black or very dark-brown.

These very handsome gulls were seen first in Table Bay in July, and afterward near the Crozet Islands. They are readily recognized by the broad, white, fringe-like band along the free edge of the wings. At Kerguelen they were very plentiful, breeding upon the island. So late as November 18, I note that the ovaries were not greatly enlarged, but that "the birds show a good deal more excitement than usual of late, circling high in air, making a great outcry, and frequently leaving their feeding-grounds to fly inland in considerable numbers". Two nests were found December 21, containing each three olive-green eggs, plentifully marked with black blotches. The nests were built up of grass and sea-weed, and were very wet within, situated just beneath the edge of herbage that fringes the shingle-beaches. All of the eggs contained feathered embryos. I had been looking for them upon the higher land, where the birds had for some time had a habit of alighting in considerable numbers, and hence had overlooked them at the time of first laying. We generally avoided the rough shingle in walking along the shore.

Excepting some signs of excitement already noted, and a tendency to congregate in considerable numbers high in the air, noticed early in November, there was never any very obvious sign that the gulls were pairing; no selection of mates or diminution of sociability. They nest also upon low land, at some distance from the sea. In such a spot, I found several young birds on January 2.

They have several different notes or cries: one, which is uttered when the bird is swimming, at some distance from the others, has been mistaken more than once for a human call of distress; another, uttered when many are together, is like the cry of the laughing-gull. There is a sort of "creak", uttered when the bird is swinging itself lazily along and a series of short calls, like the mewing of a kitten,

that I have only heard when near their nests. It was this last call, given by gulls high overhead, that directed me to the nesting-place where the young were found, January 2.

The plumage is very variable, according to age, as usual with gulls, seeming to indicate several different species. None of these birds examined which were not in full plumage showed any enlargement of the genital organs. One specimen was seen flying which had almost acquired the adult plumage, excepting only that the head, neck, and under parts were sparingly mottled with gray. The fringe of white at the ends of the primaries and secondaries was quite distinct.

On the 14th December, while watching the various birds which had gathered about the carcass of a sea-elephant upon the beach, I observed that gulls do not, in feeding from the surface of the water, use their feet and claws as instruments of prehension. They dip the bill down, seizing their prey by its aid only, even when at some little distance beneath the surface, and, at the same time, strike the water sharply with their expanded feet, thus getting an upward impulse, which maintains their flight. Two little white-rumped petrels (*T. Wilsonii*), seen on that day for the first time in broad sunshine, performed the same manœuvre in a much more dexterous and obvious manner than the gulls.

At this same time, I shot a specimen in unusually dark plumage with No. 7 shot, and at very long range. The bird seemed stupefied, but there was no external mark of injury except one shot-hole behind and above the right eye. When secured, it struggled violently, neither wings nor legs being in the least injured; but, left to itself, it showed no fear of, or wish to avoid me, stared about stupidly for a few moments, and presently put its head under its wing. I wanted to secure the better-marked specimen already mentioned, which was flying near with the rest of the flock, and, intending to take advantage of the sympathy which gulls always show for a wounded companion, set my capture on a little knoll, and retired to some distance. It put its head under its wing as before, and, although exposed to a fresh breeze which was blowing, seemed to have no difficulty in maintaining its balance. Not succeeding in drawing the specimen I wanted within range, I finished my bird after a little with a charge of small shot (No. 9), and preserved the specimen (No. 156). I omitted to mention that, when thrown up into the air, it seemed to have full power of flight, but to lack the inclination. I suppose that in this case the centers of reflex action remained intact, while such intellect as the bird possessed was paralyzed by a shot in the cerebrum.

STERNA VITTATA, Gm.

Wreathed Tern, LATHAM, Gen. Syn. iii, pt. ii, p. 359, No. 11.
Sterna vittata, GMELIN, Syst. Nat. i, 1788, p. 609.
LATHAM, Ind. Orn. ii, 1790, p. 807, No. 12.
GRAY, Gen. B. iii, 1849, p. 659.
BONAPARTE, Comptes Rend. xlii, 1856, p. 772.
PELZELN, Orn. Novara Reise, 1865, p. 152 (very full account).
Sterna albistriata, GRAY, Voy. Erebus and Terror, pl. 21.
Hydrochelidon (Pelodes) albistriata, GRAY, Handlist, iii, p. 122, No. 11078.

The fine series of this Tern collected by Dr. Kidder agrees minutely with specimens from New Zealand in the Smithsonian, identified with *albistriata* of Gray by myself some time since. It is a true *Sterna*, with a close general resemblance to *S. arctica* or *macrura* of authors; with very long and deeply-forked tail, white or nearly so; the whole body pearl-gray, not apparently paler below than above, but fading into pure white along the sides of the black cap, giving the appearance of a white stripe on each side of the head; bill and feet coral-red.

But there appears to be an earlier name for this species, in the *S. vittata* of Gmelin, based on the "Wreathed Tern" of Latham, from Christmas Island. The descriptions of both these authors apply perfectly well to the specimens in hand; and these are evidently the same as that described in detail by Pelzeln, *l. c.*, who figures the egg (pl. vi, fig. 14). Pelzeln quotes the species from Kerguelen (Mus. Brit.), St. Paul Island (Exp. Novara), New Zealand (Mus. Vindob.), and Cape of Good Hope. Gray does not give *vittata* in the "Handlist"—a circumstance tending to confirm my conviction that his *albistriata* is the same bird. Besides the two names above quoted, there are some others of partial pertinence, or supposed applicability to this Tern, which may be regarded as the antarctic representative of *S. macrura*, as the *Buphagus* of this region is of the true *H. skua*, or *Larus dominicanus* of *L. marinus*.—C.

List of specimens, with measurements.

Smithsonian (coll. Custom number.	Original number.	Date.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Tarsus.	Foot.	Longest claw.	Remarks.
		1874.											
6987	13	Sept. 24	♂	.....	.....	.....	.....	.....	.....	.....	.....	.....	Skin.
6988	19	Sept. 24	♀	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.
6984	38	Oct. 21	♀	11.15	29.00	10.25	4.15	1.35	1.50	0.75	0.75	0.25	Do.
6985	64	Nov. 10	♀	13.00	28.50	9.75	5.75	0.90	1.60	0.80	0.80	0.25	Skin with egg.
6986	65	Nov. 10	♂	13.00	28.00	10.00	5.50	1.15	1.60	0.75	0.75	0.25	Skin.
.....	116	Dec. 3	...	5.50	7.00	.....	.....	.....	.....	.....	.....	.....	Young; alcohol.
.....	149	Dec. 11	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.
.....	150	Dec. 11	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.
.....	151	Dec. 11	♀	12.50	28.50	10.00	5.35	1.45	1.65	0.85	0.75	0.30	Alcohol.
.....	194	Dec. 24	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	Young; alcohol.
.....	196	Dec. 24	♀	13.25	28.25	9.75	5.75	1.55	1.25	0.75	0.75	0.30	Skin.
6983	197	Dec. 24	♂	13.00	28.00	10.10	5.40	1.50	1.50	0.65	0.75	0.25	Do.
.....	199	Dec. 24	...	13.80	28.40	10.25	5.75	1.60	1.60	0.75	0.75	0.25	Alcohol.
		1875.											
.....	218	Jan. 2	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	Young.

Bill coral-red.

Iris very dark-blue.

Head black-capped; a line of white feathers along lower margin of upper mandible extending backward one-half inch; a white streak

from the eye backward, as wide as the eye itself, fading into pea gray; throat and cheeks pearl-gray.

Body generally pearl-gray; rump white.

Tail paler on its upper surface than the rest of the body, forked, t left fork usually the longer [?].

Tarsus and *foot* coral-red.

Claws brown or black; sometimes black with brown tip.

Stomach always contained isopod crustaceans, rolled up into balls.

Young, when first fledged, is yellow-brown, spotted irregularly w black; its bill, toes, and tarsus dirty-orange, blackening toward ti Later, the colors grow darker, feet and tarsi becoming orange-red. T young is as large as a chick, and as unlike the adult as possible.

Egg is single; of a brownish-green, blotched irregularly with bla pointed at small end; and measures 1.78 by 1.22 inches.

This pretty and fearless little tern was, perhaps, the most familiar obj on the island; several of them being always to be seen during daylig winnowing the air over the masses of kelp (*Macrocystis pyrifera*) whi covered the waters of the bay by the station. They dive readily fr a considerable height in the air, rarely missing their mark, a good-siz isopod crustacean, which seemed to constitute their sole diet. Duri the pairing-season (October), they remind one forcibly of the comm sparrow; curveting around one another, with wings half-spread, a constantly chattering. They are very bold, showing scarcely any fear man, and excited much the same kindly regard in all of us as the rob and such familiar birds do at home.

They nest on rather high and broken ground, usually under the lee a tuft of grass, and with little or no preparation. Sometimes a few dri stalks are laid together in the bottom of a barely perceptible cavit oftener a tuft of dead azorella-leaves, found ready to hand, serves the turn. An egg was first found November 7, very early in the layin season, owing to the excessive solicitude of the old bird, which flew me as I passed with amazing ferocity, snapping her bill, screaming, a making a curious sound, very like the "gritting" of teeth. Had s kept quiet, I should not have observed the egg at all. On Novemb 10 I note that many pairs had selected nesting-places, but had not y begun to lay. A young bird was first found December 4, so like t ground in color that I was near stepping on it. It is very large a heavy, and unlike the adult. On December 11, I got two young bird and shot the old one belonging, as I supposed, to one of them. I mus

however, have confounded two different individuals when following it with my eye, since the nest over which the one I shot was hovering proved to contain an unhatched egg. Its mate flew up pretty soon from the sea, alighted by the dead body, and seemed to try to arouse it, poking at it with its bill. Failing in this, he presently crept on to the egg himself, assuming his mate's place and function. It is by no means uncommon to find a male petrel or albatross sitting, but I was not before aware that the practice was followed by terns.

The nests are built not far from the sea, usually upon the slope of a hillside, where drainage is good, and generally there are a good many near together. Upon the approach of man, dog, or skua, a warning scream is sounded, and the whole colony at once fly up and make common cause against the intruder. The skua is actually afraid of them, and it is a steady-nerved man who will not dodge the vicious swoops made from time to time at his head. So near do they come on these occasions that most of my specimens were knocked down with stones while flying.

DIOMEDEA EXULANS, *Linn.*

THE ALBATROSS.

Diomedea exulans, LINNÆUS, Syst. Nat. i, 1766, p. 214, and of authors.
Diomedea spadicea, GMELIN, Syst. Nat. i, 1788, p. 568.
Diomedea albatrus, PALLAS, Zoog. Rosso-As. ii, 1811, p. —
FORSTER, Descr. Anim., ed. Licht. 1844, p. 27.
Diomedea adusta, TSCHUDI, J. f. O. 1856, p. 157. —C.

List of specimens, with measurements.

Smithsonian Institution number.	Original number.	Date.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Tarsus.	Middle toe.	Longest claw.	Remarks.
9346	181	1874. Dec. 18	♂	50.50	130.00	29.00	10.00	6.50	4.75	4.85	6.70	1.00	
9820	251	1875. Jan. 2	♀	46.85	123.00	26.50	9.00	6.50	.....	5.00	6.50	1.00	Young of year(?).

Bill white. Young of year pinkish-white.

Iris very dark-blue to purple.

Body generally white in adult; some of wing primaries, secondaries, and tertiaries being black, with fine, wavy, dark lines across parts of wing-coverts and back. The amount of black marking is variable, but appears to diminish with every moult. The young of the year are

quite black, or very dark-brown, excepting the under parts of wi throat, and cheeks, which are white, more or less mottled with blac

Tail very short in proportion to the size of the body.

Tarsus and *foot* white, with pale-blue tint, scutellated.

Claws white. No rudiment of hind toe.

Stomach membranous, filled with an oily fluid.

Eggs single, white.

None of these birds had shown themselves in the neighborhood of camp until December 17, when Mr. Train captured and brought in specimen No. 181, which he had carried more than two miles. It found near an old nest, seemingly about to rebuild it, but no egg found until December 30. On the 2d of January, the steam-lau of the Monongahela carried me several miles down the beach to the strip which connects Prince of Wales Foreland with the mainl Here I saw very many albatrosses nesting upon hillocks, built up s two feet, or more, from the ground. The nests are composed mostl grass, and, being of different heights, seemed to have been used ag and added to, year after year. I counted twenty-three birds in sigh one time, each perched upon its nest. Being conspicuous by the wh ness of their plumage, and rarely very near together, they rather rem one of the whitewashed cairns set up by surveyors. Driven from nests, and compelled to walk, they look not unlike overgrown ge The distribution of their weight compels them to stretch out their ne horizontally, and to walk with a widely-swaying gait. Two approac each other as I was watching them, and went through with some v odd manœuvres. One raised its head and spread out its wings as i embrace the other, which remained with wings folded. Both then c tered their bills, and touched them together, first on one side and t on the other. This manœuvre was repeated several times. *Phœbe fuliginosa* has the same trick of touching bills with its mate and c tering the mandibles about pairing-time; but I have never seen th approach one another with outspread wings. All of the nesting al trosses that I saw, without exception, showed a slight pinkish discol tion of the neck, as if a blood-stain had been washed out, usually the left side, and extending downward from the region of the ear.

They are dull birds, making but little attempt to defend their e beyond loudly clattering their bills. The sound thus produced is lou than would be expected, owing to the resonance of the considera cavity included by the mandibles. It is very like the sound of a

pan beaten with a stick. I knocked several off with my heavy overcoat twisted up like a rope, and secured their eggs before they recovered sufficiently to approach the nests. They climbed on to the empty nests again, however, and sat as contentedly, to all appearance, as before. I believe that they do not lay a second time. Certainly, the nest robbed December 30 was still empty January 2, although occupied by the old bird; and the whalers, who are very fond of the eggs, assert that they never find a second one in a nest that has been once robbed.

I have read somewhere that albatrosses and penguins nest together, but cannot see how it is possible. The king-penguin is the only one nesting in low land (as I am told), but none were found in this neighborhood. The eggs would be frequently immersed in water, unless raised on similar pedestals to those which the albatrosses build. (See *Aptenodytes.*)

The specimen No. 251, which is almost entirely black, was captured at sea, January 19, in latitude 39° 28′ S., and longitude 64° 33′ E., along with several others more or less marked with black. It is believed to be a young bird of the preceding year.

PHŒBETRIA FULIGINOSA, (*Gm.*) *Reich.*

SOOTY ALBATROSS.—"PEE-ARR" *of sealers.*

Diomedea fuliginosa, GMELIN, Syst. Nat. i, 1788, p. 568, and of authors generally.
Diomedea (Phœbetria) fuliginosa, BONAPARTE, Consp. Av. ii, 1856, p. 186.
Phœbetria fuliginosa, COUES, Proc. Acad. Nat. Sci. Phila. 1866, p. 186.
Diomedea spadicea, LESSON, Man. ii, 1828, p. 391.
Diomedea antarctica, "BANKS, ic. ined. 26".
Diomedea palpebrata, FORSTER, "ic. ined. 102"; Descr. Anim., ed. Licht., 1844. p. —.
Diomedea fusca, AUDUBON, Orn. Biog. v, 1839, p. 116, pl. 407; Syn. 1839, p. 335; B. Am. vii, 1844, p. 200, pl. 454. —C.

List of specimens, with measurements.

Smithsonian field-catalogue number.	Original number.	Date.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Tarsus.	Middle toe.	Longest claw.	Remarks.
		1874.											
8922	27	Oct. 30	♂	37.00	80.00	22.00	13.35	4.25	4.25	3.30	4.50	0.60	Only head, foot, and sternum preserved.
8951	53	Nov. 2	♂	37.00	84.00	22.00	13.00	4.15	4.00	3.00	4.75	0.75	Skin with egg.
8952	54	Nov. 2	♀	34.00	78.00	20.00	13.00	4.15	3.75	3.25	4.05	0.75	Do.
—	251	Nov. 21	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Embryo with egg.
	869												

full black, with a pale streak, similar in form to that of *Diomedea*, but much smaller, more compressed, with different outline of feathers at

Head mouse-colored, paler on the top and back than elsewhere.

Iris purple-gray. Eyelid covered with very small white feathers in a line one-eighth inch wide, above and behind eye. There are no other white feathers on the bird.

Body generally mouse-colored, darker on wing-coverts and back.

Tail pointed while the bird is flying, often fan-shaped while bird is at rest, the central feathers being the longest.

Tarsus and *foot* pale flesh-colored. Tibia naked 1.50 inches.

Claws horn-white. Very small rudimentary hind toe.

Stomach membranous; contained beaks of cephalopods and green fibrous masses supposed to be vegetable.

Two specimens of the sooty albatross were brought into the camp on October 16, having been captured at the entrance of a shallow cave in the face of a rock some distance inland. They were kept about the huts for some days, showing no disposition to leave. One was hurt by the dog, however, so that it died, when the other quite unexpectedly walked to the edge of a rock, spread its wings, and flew off. The dead bird was much mutilated, so that I have preserved only its head, foot, and sternum, with the measurements. The flesh was unusually pale and soft, as if the bird were young of the year.

October 24, two of the dusky albatrosses had made a nest upon a shelf formed by a considerable tuft of cabbage and azorella, at the entrance of a small cavity in the perpendicular face of a lofty rock, near the top of a hill some two miles away. Here the birds could be both seen and heard. Their scream is very loud, and not unlike one of the calls of a cat. At a distance, it has often been mistaken for the hail of a man. The name "pee-arr" has been given as descriptive of this call, which is, I believe, peculiar to the breeding-season. Another pair was seen same day circling around the same hill-top. No eggs. November 2, secured one egg and both birds. The nest is a conical mound, seven or eight inches high, hollowed into a cup at the top, and lined rudely with grass. The male was sitting when captured; the female standing on another old nest, not far away, but higher up the face of the rock. There was no evidence of an intention to rebuild the old nest. Both birds, but particularly the male, showed fight when approached, clattering their large bills with an odd noise, and biting viciously when they got a chance. The male is perceptibly the larger bird of the two. The oviduct of the female was distended, and no other egg seemed to be on its way from the ovary, making it probable that she had just laid the

single large egg found; but, of course, the evidence is not absolute that *these* two birds had paired, although found so near together.

Although I have often observed the dusky albatross sailing along very close to the surface of the water, or circling around rocky hill-tops, I have never seen it feed, except in captivity. Then both birds ate freely of fresh meat. The peculiar call (which can be heard for a very long distance) is most often given by the setting bird, and answered by its mate flying near by. The egg is single, white, and very long in proportion to its thickness.

November 12, I found another bird on a nest, in a locality similar to that already described. It stared stupidly at me, clattering its beak, and turning its head from side to side, but making no effort to escape. There was no egg. The narrow line of white feathers above and behind the eyes gives these birds a singular and striking appearance—a sort of wide-eyed, amazed air, that distinguishes them markedly from other birds. The white feathers are very minute, but quite perfect.

The nest found November 12 was shortly after abandoned by the sitting bird, apparently because it had been disturbed. Another bird was found sitting on an egg on November 22, high in the rocks, and some four miles inland. Neither of these specimens was preserved. Nos. 85 and 86 are the embryo, and the egg from which it was taken, found November 21, kindly given me by Mr. Stanley, who captured the adult at the same time.

OSSIFRAGA GIGANTEA, (*Gm.*) *Reich.*

QUEBRANTEHUESOS.—BONE-BREAKER.—"NELLY."

Procellaria gigantea, GMELIN, Syst. Nat. i, 1788, p. 563.
Ossifraga gigantea, REICHENBACH, Syst. Av. pl. 20, f. 332.
BONAPARTE, Consp. Av. ii, 1855, p. 186.
COUES, Proc. Acad. Nat. Sci. Phila. 1866, p. 32.
Procellaria ossifraga, FORSTER, Descr. An., ed. Licht. 1844, p. 343.

—C.

List of specimens, with measurements.

Smithsonian Institution number.	Original number.	Date.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Tarsus.	Middle toe.	Longest claw.	Remarks.
		1874.											
		Oct. 5	♀	33.00	76.00	19.75	7.00	4.00	4.50	3.50	4.85	0.85	Not preserved.
6924	155	Dec. 14	♂	35.00	78.00	20.00	8.25	4.35	4.40	3.50	5.05	0.85	Skin.
		1875.											
	315	Jan. 2											Young; alcohol.
	316	Jan. 2											Do.
	317	Jan. 2											Do.

Bill pearl-gray, with a flesh-tint, to pale bone-yellow.

Iris dark.

Head dirty-brown, lighter than the rest of the body, with white spot of variable extent on the chin.

Body generally very dark-brown, the under parts being lighter than the upper. Feathers on belly and under side of wings tipped with reddish-brown. Testicles very small December 14 in No. 155. Stomach membranous.

Tail fan-shaped.

Tarsus and *foot* dirty-black, brownish-gray in young. Tibia naked for 2.35 inches.

Claws streaked-black and yellowish-white. Distinct hind claw.

The "Nellies", as the whalers call them, were first seen in the bay by our station on October 3, after which date they became quite common. One was shot October 5 while flying over, but the specimen was not preserved. It was a female, and apparently a young bird, the flesh being unusually soft and pale. The sealers told me that they nested near by, and began to lay late in December. I found the young birds, however, on January 2, in the hollows between clumps of *Azorella*, almost fledged, and quite as large and heavy as the adults. They are exceedingly filthy birds, ejecting the contents of their stomachs for two or three feet from their bodies, and seeming to have a limitless supply to draw upon. Among the vomited matters I noticed many penguin-feathers. No old birds were to be seen at the time. Several young were found near together, and three were secured as specimens. In the same neighborhood was a young bird of an earlier brood, fully fledged, but not yet able to fly. Unless, therefore, there is more than one brood in a season, these petrels must be among the earliest to lay, instead of one of the latest, as we had been told.

I found the adult birds, in considerable numbers, feeding on the carcass of the sea-elephant, December 14. With their huge whitish beaks, lighter-colored heads (then covered with clotted blood), and disordered dun plumage, they reminded me strongly of vultures. Like vultures, also, they had so crammed themselves that they were unable to rise from the ground, although it was sufficiently rocky and irregular for them to do so with ease under ordinary circumstances. They waddled and stumbled to the sea, swam away, and did not rise into the air until half an hour or more of digestion, and perhaps of vomiting, had made it possible. I shot two on this occasion; but one succeeded in getting into

the water with a broken wing. The individual secured vomited copiously, as soon as wounded, an immense mass of undigested blood, fat, and intestines. The preparation and preservation of its skin was anything but a pleasant job, and, indeed, they are the filthiest birds by far found on the island. I have never heard any sound from the Nelly, nor did I find any eggs. I never saw them attack other living birds, but have found them several times eating carrion.

MAJAQUEUS ÆQUINOCTIALIS, (*Linn.*) *Reich.*

"STINKER" *of whalers.*

Procellaria æquinoctialis, LINNÆUS, Syst. Nat. i, 1766, p. 213.
GMELIN, Syst. Nat. i, 1788, p. 564.
LATHAM, Ind. Orn. ii, 1790, 821.
And of authors generally.
Procellaria æquinoxialis, VIEILLOT, Nouv. Dict. d'Hist. Nat. xxv, 1817, p. 422.
Priofinus æquinoctialis, "HOMBR. *et* JACQ."
Majaqueus æquinoctialis, REICHENBACH, Syst. Av. pl. 20, f. 340, 341.
BONAPARTE, Consp. Av. ii, 1856, p. 200.
COUES, Proc. Acad. Nat. Sci. Phila. 1864, p. 118.
Puffinus capitis bonæ-spei, BRISSON, Orn. vi, 1760, p. 137.
Procellaria nigra, FORSTER, Descr. An., ed. Licht. 1844, p. 26.

List of specimens, with measurements.

Smithsonian Institution number.	Original number.	Date.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Tarsus.	Middle toe.	Longest claw.	Remarks.
		1874.											
.....	29	Oct. 14	♂	20.00	54.00	15.00	.....	2.90	2.50	2.50	3.25	0.65	Skin.
.....	69	Nov. 15	♂	21.00	52.00	15.34	6.00	2.35	2.75	2.75	3.00	0.55	Do.
.....	177	Dec. 16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Alcohol; not measured.
.....	178	Dec. 16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.
.....	179	Dec. 16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.

Bill worn (apparently) to greenish-white, remaining black in sutures Upper mandible strongly hooked; lower much less so. Nostrils tubular, distinct, and inclosed in a separate horny sheath. Upper mandible composed of four pieces; lower, of three. No cere.

Iris black.

Head black, excepting a white spot around base of lower mandible, and for one inch below and behind it.

Body generally black; a small tuft of white feathers on abdomen.

Tail, middle feathers longest.

Tarsus and *foot* greenish-black and scutellated.

Claws black. Distinct hind claw.

Stomach internally rugose and partially muscular; contained the remains of crustaceans and beaks of cephalopods.

A single specimen of these birds (No. 29) was dug up by the dog on October 12 from a very deep burrow under a clump of *Azorella*, but none others were seen until November 15, when they suddenly appeared in the day-time in considerable numbers. On December 16, I dug up specimens with eggs, and frequently thereafter. They nest in very deep burrows, with almost always a little pool of water at their entrance, and keep up an incessant squealing while the dog is digging for them, very like the sound of the water-whistle toys, or "whistling coffee-pots", sold on the street-corners. The note is, in other words, very shrill, and constantly trilling. They fight the dog more bravely than any other petrels, generally coming out of the burrow hanging to his ear, and keeping him off very successfully on the open ground. It was one of these birds that has been elsewhere spoken of as being attacked by a skua while in the water.

The name "stinker" is fully warranted by the rank odor emitted by the bird, and is given on the authority of the whalers on the schooner Emma Jane. Captain Fuller, however, of the schooner Roswell King, a very careful observer, tells me that the stinker is a much larger bird, and that it nests on the ridges of the high hills, not in burrows, and very late in the season. If so, I have never seen it.

On December 18, while out in a boat, at some distance from the station, I saw very many black petrels, both swimming and flying, which strongly resembled these birds in every respect, except that they had not the white throat-spot described above.

An embryo (No. 185) has been preserved in alcohol.

Egg is single, white.

One of the first birds dug out by the dogs after our arrival, on September 15, was a large petrel, covered everywhere by long, gray, hairy down, and found quite near the station. They were found often afterward, and were much hunted by the dogs as food. From their squealing when captured, the structure of their bills, the depth of the burrows in which they were found, the black plumage of those subsequently taken, and their offensive odor, I supposed them to be the young of *Majaqueus*, but was assured by the whalers that they were "Mutton-birds", and of quite a different species. A curious circumstance with regard to them is the fact that I never succeeded in getting any positive clew to the old birds to which they belonged. At different times, I set snares in front of the burrows, and sprinkled light dry earth within its entrance,

but never captured any birds; nor did I ever find any tracks upon the earth. It certainly seemed as if the old birds had finally abandoned them. It must be remembered, also, that one of these young birds was found as early as September 15, and that I found Majaqueus *with egg* on December 16. The "Mutton-birds" had certainly not begun to fly before December. The two specimens preserved were captured on November 10; the wings of No. 62 being then in full feather, but the body still partially covered with down.

No. 62, 16 by 38.75 by 12; bill, tarsus, and foot black; iris dark-blue. No. 66, 13.50 by 32 by 8; bill, tarsus, and foot black; iris dark-blue; younger than 62. [Not seen by me—probably some *Puffinus*.—E. C.]

ÆSTRELATA LESSONI, (*Garn.*) *Cass.*

WHITE-HEADED PETREL.

? *Procellaria alba*, GMELIN, Syst. Nat. i, 1788, p. 565.
VIEILLOT, Nouv. Dict. d'Hist. Nat. xxvii, 1817, p. 420.
? *Daption album*, SHAW, Gen. Zool. xiii, 1825, p. 246,
? *Procellaria variegata*, "BONNATERRE". (*Bp. & Gray.*)
Procellaria lessoni, GARNOT, Ann. Sc. Nat. vii, 1826, p. 54, f. 4.
LESSON, Traité d'Ornith. 1831, p. 611.
GOULD, B. Aust. vii, pl. 49.
REICHENBACH, Syst. Av. pl. 24, f. 2605; pl. 20, f. 339.
Æstrelata lessoni, CASSIN, Proc. Acad. Nat. Sci. Phila. 1862, p. 327.
COUES, Proc. Acad. Nat. Sci. Phila. 1866, p. 142.
Rhantistes lessoni, BONAPARTE, Compt. Rend. xlii, 1856, p. 768.
Procellaria leucocephala, FORST., Descr. An., ed. Licht. 1844, p. 206.
GOULD, Ann. Mag. N. H. xiii, 1844, p. 363.
Æstrelata leucocephala, BONAPARTE, Consp. Av. ii, 1856, p. 189.
Procellaria vagabunda, "SOLANDER". (*Gray & Bp.*)

This is a large, stout species, with a strong bill, and, in adult plumage, very handsome. What is more important, in some respects, it is likewise one of the better-marked species of this difficult and thoroughly-involved group. I have reason to believe that its characters, relationships, and synonymy are worked out in my monograph above cited with fidelity and consequent reliability. Passing over some early names, of probable but unproved application to this species, it seems that *lessoni* of Garnot is the prior tenable name, though some authors give preference to *leucocephala* of Forster. When this name was first proposed I have no means of knowing, but I trace no published record of it back of 1844. This species has been figured by several authors, and is, or should be, now well known. In lieu of further remarks, I beg to refer to the paper already mentioned.—C.

Measurements of a specimen.

Consecutive field notes number.	Original number.	Date.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Tarsus.	Middle toe.	Longest claw.	Remarks.
998	311	1874. Dec. 29	♀	18.15	43.00	12.15	5.85	1.50	2.50	1.85	2.20	0.50	Skin.

Bill black, very stout and strongly hooked.

Iris very dark-brown.

Head pearl-gray; black shading around eyes; throat white.

Body, back gray; dark-brown to black over wings; breast and white; tail pearl-gray.

Tarsus and *foot* flesh-pink; black along upper surfaces of digit on the web near the claw.

Claws black.

A bird was brought to me on September 19, which I then prono to be a fulmar, but which I now believe to have been an individ this species. Unfortunately, being much occupied with other wor supposing these to be common, I disregarded it and did not preser specimen. It never afterward came under my personal notice. Eaton, naturalist of the English party, visited us on December 9 then told me that he had found a specimen, and, on December 2 specimen preserved was brought home alive by one of the men, h been dug out of a very deep burrow by the dog, at a considerab tance inland, and well up among the hills. He found no egg. them following the ship on January 18, about seven hundred miles of Kerguelen.

ŒSTRELATA KIDDERI, *Coues.*

KIDDER'S PETREL.

Procellaria grisea, KUHL, Mon. Proc. Beit. Zool. 1820, p. 144, No. 15, fig. 9. *Not tham.*

SCHLEGEL, Mus. Pays-Bas, 1863, p. 9. Exclusive of syn. "s Gould".

Œstrelata grisea, COUES, Proc. Acad. Nat. Sci. Phila. 1866, p. 148.

" *Procellaria lugens*, FORST., icon. 21", according to Kuhl.

" *Œstrelata inexpectata*, FORST.", BONAP., Consp. Av. ii, 1856, p. 189, but not of Fo

" *Procellaria unicolor*, GOULD". (*Fide Gray.*)

The single specimen of this bird brought home by Dr. Kidder is of special i and importance. It is of a species I never saw before, but one of which, with a of sagacity which proves equally unexpected and gratifying, I introduced a co account in my monograph, judging it to be, from the published descriptions, di from any one with which I was then acquainted.

The characters of this bird agree exactly with the accounts given both by Ku Schlegel, *ll. cc.*, of a bird they call *Procellaria grisea;* and there is no reasonabl tion that all three of us have the same species in view. But there is little if an ability that it is the same as *P. grisea* of Latham, which is described as having t two inches long, &c. (see what is said Proc. Acad. Phila. p. 148, foot-note, and text). In my monograph, I permitted "*grisea* Kuhl" to stand, as the names different so-called genera; but the groups are so closely allied, and birds of thi are so commonly called "*Procellaria*", that it will tend to prevent future mis standing to apply to this species a new name. And, in so doing, I take plea recognizing, to this slight extent, the excellent service which the author of thi has rendered in extending, and especially in increasing the precision of, our kno of southern oceanic birds.

For the characters of this species, and further discussion of some technical questions concerned, I would refer to the monograph already cited. The bird is a typical *Æstrelata*, of the group of smaller species that cluster around *mollis* of Gould and *cookii* of Gray ("genus" *Cookilaria* Bp.). It has every appearance of being a young bird, in dark whole-colored plumage, like others of this group when immature; but finding it breeding, with the egg, settles the question of its maturity. The whole plumage is dark-gray, nearly uniform, but sootier on the back and wings than on the under parts, with a peculiar glaucous shade throughout. The bill is very short, hardly over an inch long, and extremely *thin*, though deep and strongly hooked. Other proportions are indicated by Dr. Kidder's measurements below.—C.

Measurements of a specimen.

Smithsonian (cat.) tution number.	Original number.	Date.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Tarsus.	Foot.	Claw.	Remarks.
6870	39	1874. Oct. 21	♂	14.00	34.50	10.15	4.05	1.10	2.05	1.45	1.50	0.35	Skin with egg.

Bill black.

Skin thickly covered with fat within.

Plumage nearly uniformly sooty-gray, with a slightly bluish cast.

Tail, middle feathers longest.

Tarsus and *foot* dusky.

Claws black.

Egg single, white, 2.00 by 1.50 inches.

These birds were found October 11, with eggs, in rather deep burrows, each one of which contained a little pool of fresh water, close by where the egg was deposited. They squealed shrilly when captured, with a note very like that of *Majaqueus*. The only specimen preserved was taken, with an egg, October 21. A young bird, taken December 13, and much resembling the young "mutton-bird" (see *Majaqueus*), but far less advanced than the latter at that date, I believe to belong to this species, although the evidence is not positive. It made no sound when taken from the burrow (specimen No. 160).

These birds were common in burrows near our station early in October, and were neglected for others more difficult of access, under the supposition that they would always be at hand. After October 21, however, I never saw another adult specimen, and Mr. Eaton informed me in December that he had not yet found it at all. Doubtless, more diligent collecting and observation of the birds while they were still comparatively plentiful would have cleared up the doubt which seems still to exist as to their specific position among *Æstrelatæ*. Their neglect is

only another instance of the tendency, which so often causes mortification and chagrin to the collector, to postpone those objects which are familiar and common for others mistakenly supposed to be rare and urgent. As Dr. Hooker has so feelingly said, "These are, however, questions which propose themselves to us in the closet only, when the prospect of solving them is gone by; and when they but add to the thousand regrets over lost opportunities, the remembrance of which weighs so heavily on the mind of every naturalist that the brightest prospects of discovery in the fair future can never obliterate them."—*Flora Antarctica*, vol. ii, p. 465.

Perhaps the disappearance of these birds about the end of October may be explained on the supposition that they are really rare in the locality under consideration; but that we had, in selecting a station, stumbled upon one of their nesting-places, and actually dug up nearly or quite the entire community.

OCEANITES OCEANICA, (*Kuhl*) *Coues.*

WILSON'S STORMY PETREL.

Procellaria pelagica, WILSON, Amer. Ornith. vi, 1808, p. 90, pl. 60, fig. 6, nec auct.
Procellaria oceanica, KUHL, Beit. zur Kennt. Proc. 1820, p. 136, pl. 10, f. 1.
BONAPARTE, Journ. Phila. Acad. iii, 1824, p. 233.
Thalassidroma oceanica, GRAY, G. of B. iii, 1849, p. —.
Oceanites oceanica, COUES, Proc. Acad. Nat. Sci. Phila. 1864, p. 82.
Procellaria wilsoni, BONAPARTE, Journ. Acad. Nat. Sci. Phila. iii, 1824, p. 231, pl. 8, f. 3, 3ª, and pl. 9, lower fig.
Thalassidroma wilsoni of many authors.
Oceanites wilsoni, KEYS. & BLAS., Wirb. Europ. ii, 1840, p. 238.
BONAPARTE, Consp. Av. ii, 1856, p. 199.

I have looked at a great many "Wilson's Petrels" from various parts of the world without having been able to see any difference between them. In any event, the bird here presented is the original "*oceanica*" of Banks, Kuhl, &c.—it is the other one, *wilsoni* Bp., 1824, which is to be cut away from this one, if any division is attempted. Bonaparte has the thing hind part before in his Conspectus.—C.

List of specimens, with measurements.

Smithsonian Institution number.	Original number.	Date.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Tarsus.	Middle toe.	Longest claw.	Remarks.
		1874.											
68933	209	Dec. 30	♂	6.15	14.00	5.35	2.50	0.55	0.85	1.30	0.85	0.25	Skin.
68932	210	Dec. 30	♀	6.50	14.50	5.60	2.60	0.60	0.95	1.35	1.00	0.25	Do.

Bill black.
Iris black.

Head, *body*, *tail*, and *tarsus* blackish, excepting a white band one-half inch wide across rump.

Toes black, the webs with a yellow spot.

These birds are crepuscular near the shore, like *Procellaria nereis*, and much more common near our station after their first appearance on December 8. I had previously seen them at sea east of the Cape of Good Hope; and, on December 14, I saw them out by day feeding on the oily matters floating away from the carcass of a sea-elephant. They frequent rocky parts of the hillsides, and flit about very like swallows in pursuit of insects. There seemed to be no flying insects on the island, however, other than very minute gnats. The two specimens preserved were shot on the evening of December 29, among the rocks near the top of the hill on which we were encamped. I never succeeded in finding the egg, but learn from Rev. Mr. Eaton, who found one on Thumb Mountain, some fifteen miles from our station, that it is single, white, and that the nest was made under a large rock not far from the beach. He found the egg on December 8. I have no doubt from what I have observed of its habits that it nests among and under rocks habitually, and usually at a considerable elevation above the sea.

PROCELLARIA NEREIS, (*Gould*) *Bp.*

THE SEA-NYMPH.

Thalassidroma nereis, GOULD, Proc. Zool. Soc. Lond. 1840, p. 178; Ann. Mag. N. H. xiii, p. 367; B. Aust. vii, pl. 64.

Procellaria nereis, BONAPARTE, Consp. Av. ii, 1856, p. 196.
COUES, Proc. Acad. Nat. Sci. Phila. 1864, p. 81.

A large series of this pretty little petrel was collected, the first and only ones I have seen, excepting Gould's types, from Bass's Straits, now in Mus. Acad. Phila., from which the account given in my monograph was drawn up. It is a small and particularly elegant species, quite different from any other known to me; the bluish color recalls birds of the *Prion* group. It comes very near *P. pelagica* proper in form, belonging to the same short-legged group, as distinguished from *Oceanites* and *Fregetta*, though the legs are longer than in *P. pelagica*.—C.

List of specimens, with measurements.

Smithsonian Institution number.	Original number.	Date.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Tarsus.	Middle toe.	Longest claw.	Remarks.
		1-74.											
6838	44	Oct. 29	♂	6.50	12.75	4.75	3.25	0.50	1.00	1.25	0.85	0.25	Skin; pair.
6837	45	Oct. 29	♀	6.50	13.00	4.75	3.25	0.50	1.00	1.25	0.85	0.25	
6835	46	Oct. 31	♂	6.50	12.50	4.75	3.25	0.50	1.00	1.25	0.85	0.25	Skin.
6836	47	Oct. 31	♂	6.50	13.00	4.85	3.25	0.50	1.00	1.25	0.85	0.25	Do.
6840	157	Dec. 15	♂	6.75	12.75	4.50	2.50	0.50	0.85	1.25	0.90	0.25	Skin with egg.
6841	158	Dec. 15	♂	6.53	13.00	4.80	2.85	0.55	1.00	1.25	0.80	0.25	Do.
6834	159	Dec. 15	♂	6.75	13.00	4.75	2.65	0.55	1.00	1.25	0.85	0.25	Skin.

Bill black; nostrils in separate tube, above base of upper mandible. *Iris* black.

Head, *body*, and *tail* generally bluish-ashy, except lower part of breast and belly, which are white. Tail very dark at tip, and fan-shaped in flight.

Tarsus, *foot*, and *claws* black. Tibia naked 0.50 inch.

Egg single, white, sometimes speckled with reddish at the large end; very large in proportion to the size of the bird.

The first specimens were taken on the 28th and 29th of October, being dug out by the dogs from small burrows under clumps of *Azorella*. A pair captured on the latter date were found under a tussock not two yards above high-water mark, on the beach, under a high cliff. No eggs were found at that date. Eggs were first found, December 12, under the overhanging margins of clumps of grass and "Kerguelen tea" (*Acæna ascendens*), in a bit of swampy lowland near the sea. Strange to say, I have only found the male with the egg. In this locality, there were no burrows; the overhanging herbage seeming to afford sufficient protection to the nests.

This petrel is strictly crepuscular in habit when near its breeding-place; none having been seen by daylight except when disturbed from the nest. I believe its note to be a sort of chirping whistle, not unlike the creaking of a block, but did not succeed in settling this point definitely. No eggs were hatched before our departure from the island. The birds are, at this season, perfect balls of nearly fluid fat.

PSEUDOPRION DESOLATUS, (*Gm.*) *Gray*.

"WHALE-BIRD."

Procellaria desolata, GMELIN, Syst. Nat. i, 1788, p. 562.
LATHAM, Ind. Orn. ii, 1790, p. 825. But probably not of authors generally.
Daption desolatum, SHAW, Gen. Zool. xiii, 1825, p. 244.
Æstrelata desolata, COUES, Proc. Acad. Nat. Sci. Phila. 1866, p. 155, in part, with exclusion of much of the synonymy.
Prion (*Pseudoprion*) *desolata*, GRAY, Handlist, iii, 1871, p. 108, No. 10923.
Pseudoprion banksii, COUES, Proc. Acad. Nat. Sci. Phila. 1866, p. 166; but whether of the authors there cited?

The single prepared specimen in the collection agrees with the characters I give of *P. banksii*, so that I so identify it with little hesitation. I never identified the *Procellaria desolata* of Gmelin in the least to my satisfaction, having allowed myself to suppose that it was an *Œstrelata*, being unconsciously biased by the fact that it had been very generally so considered by writers. In attentively re-examining Gmelin's diagnosis, with reference to the specimen in hand, I find, to my surprise, that it agrees in essential points with the bird brought in by Dr. Kidder, and I am forced to the conclusion that Gray is right in referring it to my section *Pseudoprion*. It will be observe

y monograph I did not identify Gmelin's name, merely quoting his description, g to it a description of Schlegel's from the same specimen that Kuhl handled; e authors having considered it the same as Gmelin's bird. It would appear, that such is not the case, especially as we have Kamtschatka assigned as a

d here treated is *Pseudoprion banksii* of my paper, but whether the *banksii* of am now uncertain. It is also, I have now no doubt, the original *P. desolata* , as correctly allocated by Gray, and, consequently, in part the *Æstrelata* f my paper, but is apparently not the *desolata* of late authors.

pressions used by Gmelin in reference to the dark band running clear across and wings, and the dark tip to the tail, point to a *Prion*, not to one of the .—C.

List of specimens, with measurements.

	Date.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Tarsus.	Foot.	Middle claw.	Remarks.
	1874.											
0	Nov. 24	♂	10.50	23.35	7.25	3.85	1.15	1.60	1.25	1.25	0.25	Skin.
7	Dec. 10	...	11.25	24.00	7.15	4.00	1.15	1.50	1.25	1.25	0.25	Alcohol.
8	Dec. 10	...	11.30	24.10	7.50	4.00	1.25	1.60	1.25	1.25	0.25	Do.
0	Dec. 16	...	10.75	24.25	7.75	4.00	1.15	1.50	1.30	1.25	0.35	Do
1	Dec. 16	...	10.75	24.15	7.25	3.75	1.20	1.60	1.35	1.30	0.25	Do.

avender-blue, widened at base; upper mandible sharply hooked.

ils similar to those of *Halobæna cærulea*, but more distinctly ed.

nvisible during life, bluish-gray.

blue-gray above; white line above eye; blue line from posterior f eye to join the tint at the back of the head; throat and region base of bill white.

generally paler than that of *Halobæna cærulea*, but marked by a nd running from wrist-joint along radial portion of wing to and ump. This band becomes very distinct, when the bird is flying.

haped marking.

s and *foot* lilac-blue; claw black at tip, lilac or white at base; claw turns sharply outward.

narked by a black band of one-half inch at the tip.

bird was at first confounded by me with *Halobæna cærulea*, which, t greatly resembles. It was much less common at our station *alobæna*, none being observed until November 24; is smaller, ore pugnacious, and distinguished, on superficial examination, *lark* band at the tips of the tail-feathers; *Halobæna* showing a and in the same part. The beak, tarsus, and foot also are lav- lue in *Pseudoprion*, but black in *Halobæna*.

—ion burrows near the sea-shore, in lowland, under stones, or

in stony ground. The burrow is similar to that of *Halobæna*, and the birds begin to lay at about the same time. Both species being nocturnal in their habits, it was difficult to detect any differences between them in note or habits; I did not, at least, succeed in doing so.

I first saw this bird at sea, on the way out, about a hundred miles southeast of Tristan d'Acunha (South Atlantic Ocean), in July. The V-marking already described is very prominent when the birds are thus seen; and their irregularity of flight, using first one wing and then the other, with their tendency to fly in flocks, and disregard of the waste from the ship's galley—traits not common to other petrels—lead to their often being mistaken for shore-birds, or, at least, for that class of birds which are seldom seen far from land. I did not succeed in absolutely identifying any eggs.

HALOBÆNA CÆRULEA, (*Gm.*) *Bp.*

"WHALE-BIRD."

Procellaria cærulea, GMELIN, Syst. Nat. i, 1788, p. 560, and of authors generally.
Pachyptila cærulea, Illiger, Prod. 1811, p. 275.
Halobæna cærulea, BONAPARTE, Consp. Av. ii, 1856, p. 193.
COUES, Proc. Acad. Nat. Sci. Phila. 1866, f. 163.
Procellaria similis, FORSTER, "ic. ined. 86"; Descr. Anim., ed. Licht. 1844, p. 59.
Procellaria forsteri, SMITH, Ill. S. Afr. B., pl. 54.

Readily recognized at a glance by the short, square, sharply white-tipped tail.

There is no difficulty whatever with the specific names of this species; though I suspect that an expert in the intricacies of nomenclature, on diligently applying himself to the case, would discover that a different and probably a new generic name would here be admissible, if not actually required. (*Zaprium, n.*)

This strongly-specialized bird appears to be rather rare in collections. Before examining Dr. Kidder's specimens, the first received at the Smithsonian, I had only seen it in the Philadelphia Academy.—C.

List of specimens, with measurements.

Smithsonian Institution number.	Original number.	Date.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Tarsus.	Longest toe.	Middle claw.	Remarks.
		1874.											
68924	1	Sept. 16	♀	12.50	.....	.....	.....	1.50	.....	.....	.....	.....	Skin.
68922	41	Oct. 24	♀	10.75	26.25	8.25	4.60	1.15	1.60	1.35	1.35	0.25	Skin (very pale coloring).
68923	43	Oct. 29	♀	10.75	26.25	7.75	4.50	1.20	1.50	1.35	1.40	0.30	Skin with egg.
68925	63	Nov. 13	♀	12.00	25.25	8.25	4.75	1.05	1.50	1.35	1.35	0.30	Do.
.....	152	Dec. 11	Em	bryo..	.....	.....	.....	.....	.....	.....	.....	.....	Alcohol, in shell.
.....	153	Dec. 11	Yo	ung...	.....	.....	.....	.....	.....	.....	.....	.....	Alcohol, 1 week old.
.....	141	Dec. 11	...	11.00	25.85	8.50	4.50	1.20	1.60	1.35	1.50	0.25	Alcohol.
.....	142	Dec. 11	Yo	ung...	.....	.....	.....	.....	.....	.....	.....	.....	Do.
.....	143	Dec. 11	Yo	ung..	.....	.....	.....	.....	.....	.....	.....	.....	Do.
.....	144	Dec. 11	Yo	ung..	.....	.....	.....	.....	.....	.....	.....	.....	Do.
.....	145	Dec. 11	...	11.25	27.35	8.00	4.00	1.25	1.75	1.50	1.50	0.30	Do.
.....	145*a*	Dec. 11	Yo	ung..	.....	.....	.....	.....	.....	.....	.....	.....	Alcohol; young of 145.

Bill black; upper mandible sharply hooked, lower much flattened at its base.

Nostrils tubular, divided by a septum, looking upward and placed far back on the bill.

Iris very dark-brown or black; not visible during life.

Head slaty-blue on top and at back, shading into paler slate-color at the sides. Throat and parts around insertion of bill white, the slate-tint nearly meeting, from each side, under the throat.

Breast, *belly*, and under parts of wings and tail white; upper surface slaty-blue, shading into very dark tint; mottled with brown along primaries, secondaries, and tertiaries. Narrow white band, of one-half inch, at extremity of tail. The dark tint above mentioned runs from the carpal joint of either wing downward to the rump, making, when the bird is flying, a V-shaped marking, not so distinct, however, in this species as in *Pseudoprion*.

Tarsus and *foot* black and scutellated (excepting No. 41, a very pale specimen, taken with the egg, in which they were noted as pearl-gray).

Claws black, the middle claw being turned sharply outward.

Upon first landing (September 13), the hill-sides, apparently quite deserted during the day, became at night perfectly alive with these birds and a species of *Pelecanoides* (*P. urinatrix*, Gm.), flying irregularly about the rocks and hummocks of *Azorella*, and filling the air with their call. The note much resembles the cooing of pigeons, consisting of three short notes repeated in rapid succession and followed by two long ones, thus: "kŭk-kŭk-kŭk—cōō-cōō." They seemed rarely to fly over the water, but to confine themselves to the neighborhood of their burrows, sometimes alighting and again taking wing—very much as if there were legions of bats inhabiting the hill. I never succeeded in satisfying myself as to the object of this constant flight during the night, although I spent much time in watching them, since, so far as my observation extended, there were no night-flying insects whatever upon the island, nor did the structure of the stomachs of these birds seem fitted to an insect diet.

The burrows are excavated beneath the mounds of an umbelliferous plant, which abounds on the Kerguelen hill-side (*Azorella selago*, Hook. fil.), growing in dense masses of often several feet in diameter. The holes usually run straight inward for a foot or more, then turn sharply to the right or left, parallel with the hill-side, thence downward, often doubling once or twice upon themselves and communicating with other

entrances. At the bottom is an enlarged cavity, lined with fine fibers, twigs, ferns, or leaves of the "Kerguelen tea" (*Acæna affinis*, fil.), and quite dry. Here the single egg is to be found, always covered with dry powdered earth or the leaves above mentioned. diameter of the burrows at their entrance is about that of a man's Limpet and mussel shells were often found near by. Upon our arrival, two birds, male and female, were usually found in each b during the day. After they began to lay, however, but a single on to be found with the egg, usually, but not always, the female.

When set free in the day-time, the mode of flight was irregular the light were confusing to the bird. They always alighted in the after flying a mile or so. The noise of their calling was incessan ing the night, coming quite as often from the burrows as from th but became much less frequent after the middle of November, which I infer that the call is connected with the season of pairing

The egg is white, single, and measures 1.90–2.00 by 1.45–1.55 i They had probably begun to pair by the time of our arrival (Se ber 13), and the first egg was found October 23, although dou they begin to lay earlier. A young bird, covered with slate-co down, was found November 12, and frequently thereafter.

The traveler who should visit Kerguelen Island only during the returning to his ship every night, might easily fail to observe the ence of these birds at all, since, in the neighborhood of their bur they are exclusively nocturnal in their habits, being perhaps the latest to appear after night-fall. They are, however, often seen a during the day, many hundreds of miles from land.

PELECANOIDES URINATRIX, (*Gm.*) *Lacép.*

"DIVER" *and* "———" *of the whalers.*

Procellaria urinatrix, GMELIN, Syst. Nat. i, 1788, p. 560.
Pelecanoides urinatrix, "LACÉP.", GRAY, G. of B. iii, 1849, p. 646.
COUES, Proc. Acad. Nat. Sci. Phila. 1866, p. 190.
Halodroma urinatrix, ILLIGER, Prod. 1811, p. 274.
BONAPARTE, Consp. Av. ii, 1856, p. 206.
SCHLEGEL, M. P.-B. 1863, p. 37.
Puffinuria urinatrix, GOULD, B. Aust. vii, pl. 60.
Puffinuria garnoti, LESSON, Voy. Coquille, 1826, pl. 46; Man. Orn. ii, 1828, p. 394; Orn. 1831, p. 730.
Pelecanoides garnoti, GRAY, G. of B. iii, 1849, p. 646.
Halodroma garnoti, SCHLEGEL, M. P.-B. 1863, p. 37.
Procellaria tridactyla, FORST., Descr. An., ed. Licht. 1844, p. —.

As very strongly intimated in my paper, satisfactory diagnosis of the three curr reported species of this genus is wanting. Nor is my faith in their distinctness ine

on finding that these specimens, which from the locality undoubtedly represent the original *P. urinatrix*, are fully up to the dimensions of the supposed larger *garnoti*, from the west coast of South America. Observed variation in the color of the feet, which is one point that has been relied upon, lessens the probability of distinctness, especially as the ascribed coloration does not coincide in every case with the dimensions. The size and proportions of the examples examined, as carefully measured in the flesh by Dr. Kidder, warrant me in adducing the *garnoti* of Lesson as a synonym of *urinatrix*; to which I still refrain, however, from adding the *berardi* of Quoy and Gaimard.—C.

List of specimens, with measurements.

Smithsonian Institution number.	Original number.	Date.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Tarsus.	Middle toe.	Longest claw.	Remarks.
		1874.											
6929	2	Sept. 19	♂	8.50	14.00	.....	.....	0.85	.....	.....	.....	.....	Skin.
6930	3	Sept. 19	♂	9.00	14.00	.....	.....	0.75	.....	.....	.....	.....	Do.
.....	4	Sept. 19	♀	8.50	14.25	.....	.....	0.75	.....	.....	.....	.....	Do.
6931	59	Nov. 9	♀	7.00	13.00	4.85	2.25	0.75	1.60	1.05	1.05	0.30	Skin; ovaries much enlarged; 2 ovules nearly ripe.
6927	60	Nov. 9	♂	7.15	13.00	4.95	2.40	0.75	1.50	1.00	1.20	0.25	Skin; testicles enormous, as large as sugared almonds.
6928	101	Nov. 24	♂	7.60	16.00	4.75	1.95	0.75	1.50	1.05	1.00	0.25	Do.
.....	140	Dec. 10	..	8.00	16.35	4.75	2.05	0.80	1.50	1.00	1.05	0.25	Alcohol.
.....	148	Dec. 11	..	8.25	15.75	4.85	2.10	0.85	.....	1.10	1.05	.....	Do.
.....	172	Dec. 23	...	8.00	16.00	5.00	1.75	.....	1.35	1.00	1.10	0.20	Do.
.....	173	Dec. 23	...	8.00	16.00	4.85	1.75	0.75	1.35	1.05	1.10	0.25	Do.
.....	174	Dec. 23	..	8.00	16.25	5.00	1.85	0.75	1.35	1.00	1.10	0.25	Do.
.....	175	Dec. 23	..	8.00	16.00	4.75	1.80	0.75	1.35	1.05	1.05	0.25	Do.

Bill generally black; lavender-blue at quadrate basal portion of lower mandible. Upper mandible hooked; both much compressed and flattened; square at base. Nostrils placed far back, opening upward by a heart-shaped aperture, divided by a longitudinal partition, as if the upper half of a tubular inclosure had been cut off, parallel to its long axis.

Iris ash-colored; not visible during life, when only the black pupil appears.

Head blue-black above; throat white.

Body, upper parts blue-black; throat, breast, belly, and under part of tail white. Under down yarn-blue. Skin of belly naked. Plumage very fine and close. The body is remarkably large and heavy in proportion to the length of the wing; the latter being concave, similar to that of the quail. First and second primaries equal in length.

Tarsus and *foot* are placed very far back, nearly in the axis of the body; lavender-blue; not scutellated; no rudiment of hind toe.

Claws black; middle claw turned outward.

Tail very short, black above, white below.

When the Swatara was endeavoring to land a party at Possessio[n] Island, the largest of the Crozet group, early in September, I notice[d] frequently a very small diver, which took wing immediately on arisin[g] to the surface of the water, and after a short flight dived beneath i[t] without first alighting. I suppose this to have been the bird now unde[r] consideration, although, as will be seen, I failed to verify the fact abso-lutely. On the first landing of our party at Kerguelen Island, this bird was one of the two most commonly heard at night, and seen fluttering about the hillside. Its note is somewhat similar to the mew of a cat, with a marked rising inflection of sound. It cannot rise from level ground in flight, but, once in the air, flies strongly and rapidly, with a rapidly fluttering motion of the wings, very like the flight of the com-mon English sparrow. It burrows in the same localities as *Halobæna*, digging less deeply and making fewer turns in its burrow, and seems to remain therein during the day, being exclusively nocturnal in its habits when near its nest. Lays one egg, as large as a pigeon's, white and not sharply pointed; first found by me December 10. I did no[t] succeed in finding any young up to January 10, the date of our depart-ure.

I heard much from the whalers and others of the great diving power of these birds, which their structure certainly seems to indicate, witho[ut] being able to confirm the fact by personal observation. On the nigh[t] of November 23, while I was watching by the sea-shore the actions o[f] the birds flitting across the path of the moon's light upon the wate[r] with the purpose of settling this point, one flew close by my ear, with a great whirring of wings, from the sea and into the bank behind me. It could not rise again on the wing, and I captured it, with some difficulty owing to the darkness, as it was making its way back to the water. I tied a long, light string to one of its legs, carried it out some yards o[n] a plank-walk leading to the tide-gauge, and threw it into the sea. It swam well, and could rise from the water in flight, spattering for a long way with its wings, like a duck; but made no attempt whatever to dive although much frightened and restrained from flight by the string. The experiment was repeated several times with no better success. (Speci-men preserved, No. 101.) The stomachs of all the specimens examined were found to be empty, and I have no clew therefore from the natur[e] of their food.

There seems to be no reasonable doubt of the diving powers of *Pele-canoides*, however, or that it habitually seeks its food in that way, no[t]

withstanding its failure to exhibit in my presence when absolute identification was possible.

NOTE 1.—The Cape Pigeon (*Daption capensis*) and Yellow-billed Albatross (*Diomedea culminata*?) have also been seen now and then near the shore, but were not found breeding by our party. The former appeared on the evening of December 8, near our camp; and I saw it again January 2, flying to sea from inland, near Prince of Wales Foreland. The latter was common along the coast, and occasionally seen in Royal Sound.

NOTE 2.—Alcoholic specimens of an undetermined *Puffinus* are in the collection, but have not been examined by Dr. Coues.

APTENODYTES LONGIROSTRIS, *Scop.*

KING PENGUIN.

Patagonian Penguin, PENNANT, Phil. Trans. lviii, 1768, p. 91, pl. 5, in part.
Aptenodytes patachonica, GMELIN, Syst. Nat. i, 1788, p. 556, in part.
LATHAM, Ind. Orn. ii, 1790, p. 878, in part.
Pinguinaria patagonica, SHAW, Nat. Misc. xi, 1797, pl. 409 (nec Forst.).
Aptenodytes longirostris, SCOPOLI, Sonn. Voy. p. 180, pl. 113.
COUES, Proc. Acad. Nat. Sci. Phila. 1872, p. 193, pl. 5, figs. 5–8 (osteology).
Aptenodytes pennantii, GRAY, Ann. Nat. Hist. 1844, 315, and of most subsequent authors.
Sphaniscus pennantii, SCHLEGEL, M. P.-B. Urin. 1866, 3; De Dier. p. 268, fig. —.
Aptenodytes rex, BP., apud *Gray*.

—C.

List of specimens, with measurements.

Identification (Smithsonian field-station number).	Original number.	Date.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Tarsus.	Middle toe.	Longest claw.	Remarks.
.....	194	1874. Nov. 26	♂	36.00	31.50	12.50	.....	2.75	.....	1.65	3.15	1.15	Skin; lost.
.....	230	1875. Jan. 4	♂	45.50	35.00	.....	.....	.....	.....	.....	.....	.....	Skin.
.....	231	Jan. 4	♀	39.50	32.50	.....	.....	.....	.....	.....	.....	.....	Do.

The "wing"-measurement is the length of entire flipper.

Bill pointed and narrow; upper mandible black; nostrils opening in slits which extend nearly its whole length. Lower mandible black anteriorly, flesh-colored over posterior half, as if covered with mucous membrane.

Iris bright-brown.

Head black. Yellow collar from front of throat upward to behind eye, narrow at side of neck, pyriform above. Throat black.

Body generally black; breast and belly white. Feathers small, pointed, and spike-shaped.

Tarsus and *foot* black. Tarsus very short. Foot three-toed, webbed, and very stout, resembling the foot of a plantigrade animal. Large callosity under heel, upon which and the point of the tail the bird balances itself in standing, the toes not touching the ground.

Claws black.

Tail a bunch of bristles, compressed from side to side.

Tibiæ are very long, and the skin covered internally by a very thick layer of fat. The superficial muscles have numerous and broad attachments to the skin internally.

The first specimens of this penguin found near our station were met with on the beach on November 26, having apparently just come out of the water. There was but a single pair, both of which were secured, one being brought home alive. The other fought so fiercely that I had to kill him to get him home. Captain Fuller, of one of the sealing-schooners, informed me that skins taken at that time would be worthless, as the birds were beginning to moult. I skinned but one of the birds, therefore, and endeavored to keep the other alive, tying it up on the beach with a good long line to its leg. It had received a pretty severe blow on the head while being captured, which may account for a good deal of dullness during the first week or so, and for a strong aversion to the water which it showed at first. After a time, it brightened up, and would spend a large part of every day at the end of its line, splashing in the water. It finally entangled itself in the sea-weed near the bottom, and was drowned during the night (December 16). It slept bolt upright, balanced on its heels, swaying back and forth as it breathed, and snoring heavily. The neck is very extensible, so much so that the bird can stand at least a foot taller when excited than when at rest. It will frequently remain for twelve hours standing in the same place, and seems to me to be in every way a stupider bird than either *Pygoscelis* or *Eudyptes*. When thrown down, it raises itself by aid of its beak, pressing the point against a stone.

December 29, two more were captured on the beach at the other side of the point upon which we had settled. Mr. Holmes and I brought them alive across the top of the hill, and found it a very laborious undertaking. I tried to drive my bird; but a very short journey on an up-grade entirely exhausted his breath. After two or three attempts, he turned about, having made up his mind to fight it out to the last rather than

ıy further. These penguins are much less active on land than species.

was found on the coast, several miles away, on January 2, but I eggs or nests. Captain Fuller, of the schooner Roswell King, s me that they do breed upon the eastern side of the island, on wland, but that they build no nests whatever, carrying the egg in a pouch between the legs, and only laying it down for the pur- f changing it from male to female. I have questioned Captain again upon this subject since my return from the expedition, and erts that he has verified the fact repeatedly from personal observa- The pouch, if there is one, can be no more than a fold of the skin, one was noticed in skinning or measuring the specimens. The tory has been told of other penguins (see *Pygoscelis*). I can only at I have always found Captain Fuller's statements in other mat- be reliable, and look upon him as an unusually careful observer, n add no evidence of my own in this case.

PYGOSCELIS TÆNIATA, (*Peale*) *Coues.*

"JOHNNY" *of sealers and whalers.*

ıes papua, FORSTER, Comm. Soc. Reg. Gött. iii, 1781, p. 140, pl. 3. (Nomen ineptum.)
BONNATERRE, Ency. Méth. i, 1782, p. 67, pl. 17, f. 3.
GMELIN, Syst. Nat. i, 1788, p. 556.
LATHAM, Ind. Orn. ii, 1790, p. 879.
VIEILLOT, Gal. Ois. pl. 299.
GRAY, Voy. Erebus and Terror, pl. 25.
papua, CASSIN, Orn. U. S. Expl. Exped. 1858, p. 264.
GOULD, Proc. Zool. Soc. 1839, p. 98.
us papua, SCHLEGEL, Mus. Pays-Bas, iii, 1866, p. 5.
is papua, HYATT, Proc. Bost. Soc. N. H. 1871, p. —.
ıes tæniata, PEALE, U. S. Expl. Exped. 1848, p. 264.
is tæniata, COUES, Proc. Acad. Nat. Sci. Phila. 1872, p. 195.
is wagleri, SCLATER, P. Z. S. 1860, p. 392.

List of specimens, with measurements.

Date.	Sex.	Length.	Extent.	Wing.	Tail	Bill.	Head.	Tarsus.	Middle toe.	Longest claw.	Remarks.
1874. Dec. 30	♀	30.50	21.50	10.00	5.60	2.85	3.50	1.00	2.60	1.05	Skin; packed in salt.
1875. Jan. 4	..	29.50	22.25	9.25	6.50	3.25	.....	1.25	2.35	1.00	Skin; sex not recorded; packed in salt.
Jan. 4	..	23.50	24.00	10.00	6.85	3.15	4.10	1.25	2.35	0.85	

Bill, lower mandible and lower margin of upper mandible brilliant orange; upper portion and tip of upper mandible black.

Nostrils opening by slits at sides of bill, 1.25 inches from its tip. Bill as a whole, long, narrow, and pointed.

Head black, excepting an irregularly dumb-bell-shaped white band from eye to eye; the narrowest part of the marking being at the back and top of the head.

Iris rich-brown. Pupil lozenge-shaped when contracted.

Body, belly, breast, and underside of flippers white, the remainder of the body being black. The scales on the flippers are more evidently rudimentary feathers than in other penguins, the lowermost row being tipped with white. The feathers generally are small, pointed, and without distinct blade, similar to "pin-feathers".

Tail compressed from side to side, formed of very stiff quills, and disposed like the canvas of a tent, the ridge looking upward.

Tarsus and *foot* orange-colored, scutellated.

Claws black. Distinct rudimentary hind toe.

On the arrival of the Swatara at Kerguelen, these birds had already begun to lay, and we had their eggs for breakfast on the morning of September 10, finding them quite free from any fishy flavor, and although rather insipid, a very acceptable change from sea-diet. The fact that when cooked the albuminous portion only partially coagulates renders them less inviting in appearance than other eggs; and, probably on this account, the custom is to serve only the yelks. Two or three of the birds were captured by the boat's crew which went on shore after the eggs, and brought back to the ship, where they created a good deal of amusement. When walking away from the spectator, swaying from side to side, with flippers hanging well away from the body, they bear a ridiculous resemblance to small children just beginning to walk who have put on overcoats much too long for them. A rookery was found about two miles from our station, which I visited September 16, finding many eggs. It is established upon the seaward extremity of a high rocky ridge, running nearly parallel with the trend of the shore, and abutting upon the sea in lofty bluffs. At the foot of this ridge is a little rocky cove, where the penguins land, and beyond the coast becomes precipitous, the rocks rising perpendicularly some hundred or more feet. Up the very steep inland slope of this hill, thickly overgrown with the "Kerguelen cabbage"* and "tea",† the penguins have to climb, after

* *Pringlea antiscorbutica.* † *Acæna affinis.*

crossing a considerable upland meadow. Numerous very distinct paths have been worn by successive generations of penguins, until the defiles cut in the sod near the sea are, in some cases, as much as four feet in depth. The track to a penguin-rookery and their landing-place are always marked by a remarkably luxuriant growth of a plant with long feathery fronds, belonging to the order *Compositæ*.* The tracks followed the course of a small stream in this instance, and ascended pretty sharp acclivities, steep enough to try one's wind in following them up, until a level plateau was reached on top of the hill. The eggs (which were here never more than one to a nest) were laid either in hollows between the mounds of *Azorella* which covered the plateau, or in little bare spots scratched on their tops. I did not succeed in verifying the statement, constantly re-affirmed by whalers and sealers, that the female takes up her egg again into the oviduct, when disturbed, and carries it off; but I have seen a female, disturbed from the nest, drop her egg again at some yards' distance when waddling off. I should suppose it more probable that she carried it between the thighs (tibiæ), the structure of which makes such a proceeding quite possible. This particular rookery had been long known to the sealers, who make their rendezvous some ten miles distant, at Three Island Harbor, and who had already robbed the nests when we arrived; consequently, the birds had constantly been driven higher up the hill and farther inland, until, at the time of our coming, they were found nesting fully half a mile from their landing-place, and at an elevation of about three hundred feet. The eggs resemble in size and shape those of a duck, being, as a rule, rather larger. The brood from which my specimens were collected must have been at least the ninth or tenth laying since the season commenced. At other and more distant rookeries, subsequently visited, where the birds had not been so often disturbed, they were found to lay nearer the coast, and, as a rule, two young were found to each old bird. Singularly enough, one of these was always well-grown, apparently from one to two months old, while the other had just been hatched or was still in the egg. It must, consequently, be the practice of these birds to rear two broods in a season, keeping both in the nest at the same time. No other birds lay among or near them; and it seems quite impossible that the albatross should do so in any locality, as has been made evident in describing the nest of that bird.

Perhaps one hundred and fifty individuals were to be seen at a time

* *Leptinella plumosa.*

at the rookery near us, standing gravely together for hours and doin
nothing, as is their custom; but a small proportion being nesting female
Probably half as many more, in companies of twenty or so, were labor
ously toiling up the steep paths from the sea. So long and difficult
journey seems strange enough, undertaken by birds so slow of locom
tion as penguins. But members of this species at least are by no mea
slow in getting over the ground, and, although they do not unfrequentl
fall upon their bellies, they are prompt in picking themselves up agai
and seem to look upon such falls as a natural part of their progre
They do not at all find it necessary to drag themselves up a gentle slo
on their bellies by the aid of flipper and beak, as has been stated.

No living thing that I ever saw expresses so graphically a state
hurry as a penguin when trying to escape. Its neck is stretched o
flippers whirring like the sails of a wind-mill, and body wagging fr
side to side, as its short legs make stumbling and frantic efforts to
over the ground. There is such an expression of anxiety written
over the bird; it picks itself up from every fall and stumbles again w
such an air of having an armful of bundles, that it escapes capture q
as often by the laughter of the pursuer as by its own really considera
speed.

On the 3d of December, near the landing-cove already mentioned, about the time of hatching, I observed a school of these penguins progressing by leaps clear of the water; one following another in so rapid succession that two or three were always in the air, and with a motion so like that of a school of porpoises, that I at first took them for those marine mammals. In the water, indeed, all awkwardness at once disappears; their speed in swimming being almost incredible, and surpassing, of course, that of the fish upon which they feed.

December 4, I found one young penguin just hatched and three more still in the eggs, which they had broken with their beaks. As already stated, however, this rookery was very much behind time, and I know of a young penguin having been captured as early as October 12. The young were covered with soft, hairy, pearl-gray down. Head black above and behind; bill flesh-colored; feet black on the soles and flesh-colored above. (Original numbers 119, 120, 121, and 122.)

EUDYPTES CHRYSOLOPHA? *Brandt.*

ROCK-HOPPER.

? Eudyptes chrysolopha, BRANDT, Bull. Acad. St. Pétersb. ii, 324.
SCHLEGEL, M. P.-B. Urin., p. 7.
COUES, Proc. Acad. Nat. Sci. Phila. 1872, p. 204.

The specimens collected by Dr. Kidder seem to agree better with *chrysolopha* than with *chrysocome*, in the lighter and more bluish shade of the upper parts, weaker bill and general elongation of the coronal feathers; although the yellow plumes on each side of the head are neither so long nor so brightly colored as in the Philadelphia Academy's specimen, upon which my actual knowledge of *chrysolopha* rests. I am still of opinion that difficulty will be found in establishing the supposed species upon a satisfactory basis.—C.

List of specimens, with measurements.

Smithsonian (nstitution number.	Original number.	Date.	Sex.	Length.	Extent.	Flipper.	Tail.	Bill.	Head.	Tarsus.	Middle toe.	Longest claw.	Remarks.
		1874.											
.....	50	Nov. 1	♂	22.00	16.00	3.50	5.00	2.00	3.00	1.15	2.00	.....	Skin; afterward lost.
.....	51	Nov. 1	♂	23.00	18.00	3.75	.....	.....	.....	.....	.....	.....	Do.
.....	186	Dec. 23	♀	23.85	15.50	*6.50	6.00	2.00	2.75	0.85	2.15	0.75	Skin; preserved in salt.
.....	202	Dec. 27	♀	23.00	16.00	*6.50	5.25	1.75	2.85	1.00	2.60	0.75	Do.
		1875.											
.....	223	Jan. 4	♀	23.00	16.00	*6.50	5.25	1.75	2.80	1.00	2.65	0.75	Do.
.....	226	Jan. 4	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	Skin; not measured.
.....	227	Jan. 4	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.
.....	228	Jan. 4	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.
.....	229	Jan. 4	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.

* Whole length of flipper.

Bill conical, orange. Nostrils not apparent.

Iris deep-pink.

Head black; crested by a broad horizontal layer of feathers, directed backward, and radiating from insertion. The marginal plumes, lying just above each eye, are mustard-yellow, those in the center being black. Tongue strong and pointed, furnished with five longitudinal rows of teeth, the palate being supplied with four.

Body, throat and belly white; nape and back blackish; the dividing line between the colors running through the insertion of the flippers.

Tail spike-shaped, flattened from side to side.

Tarsus short and stout; "skin" white. Foot same color; three toes palmate; hallux rudimentary, black on plantar surface.

Eggs two, white; one generally larger than the other.

These brave little penguins had established a large rookery not more than two miles from our station, where I found them nesting on the 7th of December. They had begun to appear along the coast early in November; two of them having been captured and skinned on the 1st of that month. Probably, they begin to lay about the first of December. The rookery above mentioned was established among the loose rocks, from the crevices of which a coarse grass (*Festuca*) grew abundantly, just where the *débris* from the precipice above makes a sort of steep "lean-to" against its side, and sloping sharply into the sea. The nests are rather more distinct than those of *Pygoscelis*, and most of them were lined with dried grass. Each contained two white eggs, of which one was usually larger than the other; and both birds were, as a rule, by each nest. Whether one hunts to feed the other or not, I cannot say. A small flock came in from sea while I was present, announcing their arrival by a single shrill whistle, frequently repeated, and answered from the shore. They were wonderfully courageous, erecting their sulphur-colored plumes, and trembling all over with excitement on my approach, while they kept up a strident cackling that was almost deafening. Although knocked off their nests and down over the steep rocks for often twelve or fifteen feet, they would pick themselves up and scramble back again with unabated courage, threatening, and even biting sharply, to the very last. I suppose that the thick layer of fat beneath the skin, particularly abundant in this species at this time, serves as a protection against the hard knocks which they frequently get in falling from the rocks; no ordinary fall seeming to have the least effect upon them. They seem to dread far more the attacks of their neighbors, which harry them from almost every crevice as soon as they leave their own proper nest. The whaler's epithet "rock-hopper" is in this case particularly well applied, since they are the most agile of all penguins, skipping from rock to rock, climbing very steep inclined surfaces, and getting over the ground with great speed. It is worthy of notice that these penguins always *hop*, using both feet at a time like a sparrow, and never walk, as do other genera. Cormorants and *Chionis* were their nearest and most friendly neighbors, particularly the latter. As soon as one is knocked off its nest, its mate immediately covers the egg, showing the same anxiety and courage. No eggs had been hatched so late as January 4, the date of my last visit to the rookery.

The apparent widening of the cheeks, caused by the erectile plumes and the position of the feathers below them, with the plumes themselves,

looking not unlike "whiskers" on a front view, have given rise to the name "sea-cats", occasionally applied to these birds.

On January 19, being then at sea, in latitude 39° 28′ south, longitude 64° 33′ east, and fully six hundred miles from the nearest land, a small penguin, supposed then to be one of this species in poor plumage, was observed following the ship. It seemed to mistake the ship (Mononga-hela) for an island, and swam around it nearly all day, trying to find a landing-place, the wind being light, and the ship going from two and a half to three knots through the water. We had thus an excellent opportunity to observe from above the penguin's manner and great facility in swimming. It always dives when intending to swim with speed, and uses its flippers with great effect, looking precisely like a fish—a small shark, perhaps. It had not the slightest difficulty in keeping up with us.

EUDYPTES DIADEMATUS, *Gould.*

"MACCARONI."

Eudyptes diadematus, GOULD, Proc. Zool. Soc. 1860, p. 419.
SCHLEGEL, Urin. M. P.-B., ix livr. 1866, p. 8.
COUES, Proc. Acad. Nat. Sci. Phila. 1872, p. 206.

A fragment of skin, from a characteristic spot (top of the head), enables me to identify the species as an inhabitant of Kerguelen's Land.—C.

These penguins nest upon Kerguelen Island, as I am informed, but not upon that part selected by our party as an observing-station; nor have I any other specimens than a *scalp*, brought me as a present from Heard's Island by one of the elephant-sealers. It appears, however, that they do not differ materially in habits from *E. chrysolopha*, choosing the same localities for nesting, and progressing by the same hopping gait.

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Department of the Interior:

U. S. NATIONAL MUSEUM.

DEC 23 1891

— 3 —

BULLETIN

OF THE

UNITED STATES NATIONAL MUSEUM.

NO. 3.—CONTRIBUTIONS TO THE NATURAL HISTORY OF KERGUELEN ISLAND.

BY

J. H. KIDDER, M. D.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1876.

Department of the Interior:

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— 3 —

BULLETIN

OF THE

UNITED STATES NATIONAL MUSEUM.

No. 3.

PUBLISHED UNDER THE DIRECTION OF THE SMITHSONIAN INSTITUTION.

WASHINGTON:
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1876.

ADVERTISEMENT.

This work is the third of a series of papers intended to illustrate the collections of Natural History and Ethnology belonging to the United States and constituting the National Museum, of which the Smithsonian Institution was placed in charge by the act of Congress of August 10, 1846.

It has been prepared at the request of the Institution, and printed by authority of the honorable Secretary of the Interior.

JOSEPH HENRY,
Secretary Smithsonian Institution.

SMITHSONIAN INSTITUTION,
Washington, February, 1876.

CONTRIBUTIONS

TO THE

NATURAL HISTORY

OF

KERGUELEN ISLAND,

MADE IN CONNECTION WITH THE UNITED STATES TRANSIT-OF-VENUS EXPEDITION, 1874-75.

BY

J. H. KIDDER, M. D.,

PASSED ASSISTANT SURGEON U. S. NAVY.

II.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1876.

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PREFACE.

This bulletin embodies the results of an examination of the eggs contained in my collection, the identification of the plants by the various specialists to whom they had been sent and the determinations of the remainder of the zoölogical collections from Kerguelen Island. The appendix contains a brief description of the collections of Surg. E. Kershner, U. S. N., in the Chatham and Auckland Islands and in New Zealand; and of Mr. I. Russell, in New Zealand.

The unknown young bird, supposed to be a *Puffinus* (Bull. No. 2, pp. 26 and 27), proves to belong to *Œstrelata lessoni;* and many of the eggs, being new to museums, present points of greater or less scientific interest.

The botany of Kerguelen Island had already, as is well known, been very thoroughly studied by Dr. J. D. Hooker, in connection with Sir James Clarke Ross' Antarctic Expedition (1839–'41). His great monograph upon this branch of natural history, the *Flora Antarctica*, has left little for the botanical collector to do in that field, and, magnificently illustrated as it is, was of constant service to me while on the island. But seventeen flowering-plants are included in the collection, belonging to eleven natural orders; four of these being grasses. Three varieties of *Ranunculus* are added to Dr. Hooker's list, while two Phænogams attributed by him to the locality (a *Juncus* and *Limosella aquatica*) were not found. Since, however, this distinguished observer did not have an opportunity of visiting the island during the season of flowering, many of these specimens have their weight in determining points which still remained doubtful in his mind; notably with regard to *Lyallia Kerguelensis*.

Other plants not heretofore attributed to this locality are: *Polypodium vulgare*, *P.* (*Grammitis*) *australe*, and *Cistopteris fragilis*, among Ferns; *Grimmia frondosa* (new species) and *G. kidderi* (new species), among Mosses; *D'Urvillea harveyi*, *Rhodomela gaimardi*, *Callithamnion ptilota*, and *Codium adhærens*, among Sea Weeds; and *Pannaria taylori*, *P. glaucella*, *Placodium bicolor*, and *Urceolina* (new genus) *kerguelensis* among Lichens.

The zoölogical collections, although comparatively small, contain an unusual number of new genera and species, notably in molluscs, insects, crustaceans, and echinoderms. Descriptions of these have been furnished by Profs. Verrill, S. I. Smith, Dall, Hagen, and Osten-Sacken, and will be found under the appropriate headings. Thanks are due to these gentlemen and to others whose co-operation has added much to the scientific value of this report.

The Bulletin concludes with a study of *Chionis minor*, an unique and little-known bird, with an attempt to establish its proper position in classification.

J. H. K.

SMITHSONIAN INSTITUTION,
Washington, D. C., November 1875.

OÖLOGY, ETC.

By J. H. Kidder and Elliott Coues.

Chionis minor, *Hartl.* (p. 1.)*

Lays two or three eggs, differing much in color (*auct.* Rev. A. E. Eaton), about January 10, in the crevices formed by fallen rocks. The nest is made of grass-stems (*auct.* Capt. J. J. Fuller, not seen by J. H. K.). But a single specimen was preserved, given by the Rev. Mr. Eaton, and this was badly broken, but has been mended upon a plaster model. The specimen is regularly oval in shape, like a rather small and narrow hen's egg. Seen under a lens, the outermost calcareous layer appears to be deposited in an irregular net-work, upon a substratum of dark slate-color. The shell is thick and of coarse texture. The superficial markings include several shades of dark sepia-brown, disposed in irregular blotches, but arranged, for the most part, longitudinally. These blotches are more plentiful and closely aggregated about the thickest part of the egg than at either end, and overlie a general *café au lait* tint, which proves, under the lens, to be due to the appearance of the dark substratum above mentioned, through the minute areolation of the outer calcareous layer. The measurements are as follows:—

Smithson. No.	Orig. No.	Measurements.
	245	2.28 × 1.48

Querquedula eatoni, *Sharpe.* (p. 4.)

Lays four or five eggs, about November 15, in a deep hemispherical nest, excavated in the ground, generally near the water, well

* This reference and others like it, placed after the name-headings, refer to a previous eport upon the Birds of Kerguelen Island by Dr. J. H. Kidder, U. S. N., *Bull. Nat. Mus.*, No. 2, 1875.

Measurements of eggs are in English inches and decimals. The lengthwise and crosswise diameters, and, in some cases, the corresponding circumferences, are the dimensions given.

The structure of the egg-shell is described as it appe

concealed by grass, and lined with feathers from the breast of the [illegible] bird. The eggs vary in shape from a regular ovoid to an ellipsoid, a[illegible] differ considerably in size. The shell is thin, smooth (as usual in t[illegible] family), and compactly homogeneous in structure, showing under t[illegible] lens only very shallow linear depressions. Color is a uniform p[illegible] olive-green. Measurements are as follows, the braces including spe[illegible] mens found together in a single nest: —

Smithson. No.	Orig. No.	Measurements.	Remarks.
17179	123*a*	1.80 × 1.35	}
17180	123*b*	2.00 × 1.40	}
17181	123*c*	2.10 × 1.42	} Set No. 1.
17182	123*d*	2.18 × 1.45	}
17183	123*e*	2.10 × 1.49	}
17175	154*a*	1.90 × 1.40	}
17176	154*b*	2.18 × 1.50	} Set No. 2.
17177	154*c*	2.00 × 1.50	}
17178	154*d*	2.08 × 1.49	}

GRACULUS CARUNCULATUS, (*Gm.*). (p. 7.)

Eggs are two or three in number, first found November 5. Nests are built on rocky shelves in the precipitous faces of cliffs overlooking the sea. The base of the nest is built up to a considerable height, sometimes as much as two feet, and is composed of mud, excrement, and decaying vegetable-matter. Upon this pedestal are arranged blades of grass, inclosing a cup-shaped cavity some ten inches across. It would seem that the old nests are used year after year; a new layer being added each season, so that they differ considerably in height. In shape, the eggs are long sharply-pointed ovoids. The structure of the shell is coarsely granular, and the color is an uniform pale green. Externally, there is the usual considerable calcareous deposit, which appears under the lens to be structureless, chalky, and disposed in masses of unequal thickness. It is here and there striated, wrinkled, or otherwise marked, as if deposited in a soft state, and afterward hardened by exposure to the air, leaving the shell proper partly exposed, especially about the smaller end.

e measurements are as follows:—

Smithson. No.	Orig. No.	Measurements.	Remarks.
17195	72*a*	2.45 × 1.53	
17195	72*b*	2.40 × 1.57*	Set No. 1.
17195	72*c*	2.59 × 1.57	
17196	73*a*	2.60 × 1.62	Set No. 2.
17196	73*b*	2.50 × 1.58	
17197	74*a*	2.40 × 1.55	Set No. 3.
17197	74*b*	2.58 × 1.58	

ung.—In addition to the remarks already given upon the young of ird by Dr. Kidder in his previous paper, the following facts are erest: Much of the under mandible is pale bluish, the chin yel-, with a transverse line of demarkation from corner to corner of outh, the color being sharply defined against the general blackish the body. The horny tip of the bill is light-colored, as is usual, he bill otherwise very soft. The aperture of the eye is extremely ; lids light-colored. The wings show the very tardy development d by Dr. K. in the case of the legs, being extremely small and Another specimen, some eight or ten inches long, shows the same ish color of the pouch, abruptly defined against the blackness of roat; the eyelids being, however, entirely dark. The wings and xhibit the same evidence of very tardy development.

BUPHAGUS SKUA ANTARCTICUS, (*Less.*) *Coues.* (p. 9.)

nests are shallow cavities in the long grass, sparingly lined with stems, and always situated in a dry spot. Eggs are only two in er in the four instances observed; first found November 17. A egg was found December 20 in a nest robbed December 3. The is a very broad ovoid, tapering rapidly to a sharp point. Shell tle and of loose texture, being composed of irregularly prismatic set side by side perpendicularly to the surface. Externally it is ly granular. Color is dark olive-drab, marked superficially by lar blotches of Vandyke-brown. Deeper markings appear as es of dark bluish stone-color. The blotches are more plentiful the butt-end. Those of the same nest agree generally in color, but ent clutches show considerable variety of tint. Nos. 134 *a* and *b*, nal number) for example, are generally of a pale olive-gray, and lotches are scarcely deeper in hue than dirty Indian-yellow.

The measurements are as follows:—

Smithson. No.	Orig. No.	Measurements.	Remarks.
	117*a*	2.80 × 2.15	Containing embryos.
	117*b*	2.91 × 2.18	
17150	134*a*	2.85 × 2.00	Pale specimens.
17150	134*b*	2.92 × 2.05	
17149	200	2.70 × 2.10	Second laying.

Nos. 117 *a* and *b*, containing embryos, have been sent to Prof. E. Morse for examination.

LARUS DOMINICANUS, *Vieill.* (p. 13.)

Nests are built of grass and sea-weed, near the sea, and are gene ally wet within. Eggs are three in number, and in shape a pointe ovoid, approaching to pyramidal. The shell is rather stout, brittle, an composed of two distinct layers of about equal thickness. The extern layer is coarsely granular in texture, roughly mammillated superficiall and of a dark olive-drab color, blotched by irregular spots of differen tints, Vandyke-brown, sepia, slate-color, and brownish-yellow. The slat markings are within the shell, the others on the surface. As in th case of *Buphagus*, those of the same nest are generally similar in mar ing, while those of different nests show considerable variety of hu The internal layer of the shell is closer in texture, of a pale apple-gre color, and shows under the lens innumerable small whitish trapezoi columns set transversely to the surface, in a matrix of a pale-gr homogeneous basis-substance. The blotches are more closely aggrega at the large end of the egg than elsewhere, and vary in shade acc ing to their situation, superficial or deep. Some specimens of t eggs are not distinguishable with certainty from those of nort gulls—*Larus argentatus* for example.

The measurements are as follows:—

Smithson. No.	Orig. No.	Measurements.	Remarks.
17151	199*a*	2.93 × 1.90	Set No. 1.
17152	199*b*	2.87 × 1.92	
17153	199*c*	2.75 × 1.85	
17154	201*a*	2.58 × 1.98	Set No. 2.
17155	201*b*	2.53 × 1.92	
17156	201*c*	2.58 × 2.00	

The young, a few days old, have the bill black, with yellow tip, the feet dull blackish, webs partly dull whitish. The general plumage is black, mottled with yellowish-brown, much paler, inclining to white, below, as usual in this family of gulls.

In embryos about to be hatched, the bill and feet are nearly colorless; the former somewhat mottled with black. The general plumage, so far as it can be determined from wet preparations, is much as has been already described.

STERNA VITTATA, *Gm.* (p. 17.)

The single egg is laid on high and broken ground, usually under the lee of a tuft of grass, and with little or no preparation. First found November 7. The shell is thin, elastic, and finely granular in texture, of general olive-green color. The ground-color varies widely, as usual in this family of birds, from rather clear green, with a suspicion of drab, to a decided brownish drab. Superficial markings are chocolate-brown of several shades, disposed in irregular spots and blotches, rather more thickly crowded toward the larger end. Deep markings show various shades of bluish slate-color, according to the thickness of the overlying deposit. The shape of the egg is a regular ovoid, and the measurements are as follows:—

Smithson. No.	Orig. No.	Measurements.
17188	61	1.78 × 1.22
17187	75	1.82 × 1.29
17184	76	1.82 × 1.27
17185	77	1.83 × 1.30
17186	78	1.75 × 1.23
17189	96	1.85 × 1.20
	97	1.80 × 1.25
		1.70 × 1.27

The young, when first fledged, is yellowish-brown, spotted irregularly with black; its bill, toes, and tarsus dirty-orange, blackening toward tips. Later, the colors grow darker, feet and tarsi becoming orange-red. It is as large as a chick, and very unlike the old bird in marking and general appearance. Specimens of the embryos have been sent to Professor Morse for examination.

DIOMEDEA EXULANS, *Linn.* (p. 19.)

Nests are on tall mounds, built up of grass to the height of two or more feet from the ground, and, being of different heights, seem to have

been used again and added to year after year. The egg is single, elliptical in longitudinal section, and but slightly thicker at the large than at the small end. Only occasional specimens tend somewhat to the ovoid form. The shell is white, of loose granular texture and roughly mammillated surface. There are no markings beneath the superficial calcareous layer, and the spots which appear on this seem to be adventitious stains from the secretions of the oviduct, or accidental soiling after extrusion. Some specimens show a reddish stain upon the larger end, probably dried blood, since it is readily washed off.

The measurements are as follows:—

Smithson. No.	Orig. No.	Length.	Width.	Long circumf.	Short circumf.
17097	222*a*	4.96	3.18	13.15	9.65
17098	222*b*	5.08	3.08	13.15	9.70
17099	222*c*	4.80	3.18	12.90	10.04
17100	222*d*	5.21	3.25	13.80	10.50
17101	222*e*	4.80	3.10	12.80	9.60
17102	222*f*	4.88	3.22	13.10	10.18

No young were hatched previous to January 11.

PHŒBETRIA FULLIGINOSA, (*Gm.*) *Reich.* (p. 21.)

Nests on rocky shelves or in caves in the faces of lofty cliffs where the birds build a conical mound, seven or eight inches high, hollowed into a cup at the top and lined rudely with grass. Egg is single, broadly ovoidal, generally white, marked by a collection of specks about the larger end, somewhat like the adventitious stains on the eggs of *D. exulans*, but, as well as we can judge, less superficial. The shell is compact in structure, rather thin for its size, and superficially smooth to the touch. Under the lens, it is seen to be marked by minute pits and linear depressions, being thus decidedly different, both to the eye and to the touch, from those of *D. exulans*.

The measurements are as follows:—

Smithson. No.	Orig. No.	Length.	Width.	Long circumf.	Short circumf.
17104	52	3.95	2.64	10.50	8.40
17103	86	3.95	2.60	10.50	8.25

An embryo has been sent to [redacted] Morse for examination.

OSSIFRAGA GIGANTEA, (*Gm.*) *Reich.* (p. 23.)

Lays a single egg on open, rather elevated ground, at some distance (half a mile) from the sea. There was no vestige of an artificial nest when the young were found, January 2. These were then nearly fledged, and quite as large and heavy as the adults, occupying natural hollows between mounds of *azorella*. They are exceedingly filthy birds, ejecting the contents of their stomachs for two or three feet from their bodies, and seeming to have a limitless supply to draw upon. When disturbed, they are soon surrounded by a puddle of vomited matters, and are, in this condition, by no means pleasant birds to collect. Among the ejecta were noticed many Penguin feathers. In the same neighborhood was a young bird of an earlier brood, fully fledged, but not yet able to fly. These Petrels must therefore be among the earliest in laying. The down of the young bird is entirely gray in color, the head is partly naked, and the bill, tarsi, and feet are colored nearly as in the adult, but somewhat paler. The first fully-formed feathers are similar to the adult plumage.

MAJAQUEUS ÆQUINOCTIALIS, (*Linn.*) *Reich.* (p. 25.)

Nests in very deep burrows in hill-sides, generally under a mound of herbage. Near the entrance to the burrow, there is always, so far as observed, a small pool of fresh water. Egg is single, regularly ovoid, and white, without shell-markings of any kind. It is generally, however, much soiled by secretions from the oviduct and dirt from the burrow. The shell is thin, homogeneous, and compact in structure, very smooth to the touch, but under the lens is seen to be marked by small pits and shallow linear depressions.

The measurements are as follows: —

Smithson. No.	Orig. No.	Measurements.
17105	189*a*	3.00 × 2.10
17106	189*b*	3.08 × 2.12
17107	189*c*	3.18 × 2.19
17108	189*d*	3.17 × 2.17
17109	189*e*	3.32 × 2.13
17110	189*f*	3.14 × 2.20
17111	189*g*	3.26 × 2.17

No young birds were identified as of this species.

ŒSTRELATA LESSONI, (*Garn.*) *Cass.* (pp. 27, 39.)

On pages 26 and 27 of the report preceding this, upon the birds of Kerguelen Island,* were described a series of undetermined young birds, with the note by Dr. Coues, "Not seen by me—probably some *Puffinus*." Upon examination of the specimens preserved, there remains no reasonable doubt that they are the young of *Œestrelata lessoni*. The bill is that of an *Œestrelata*, and the measurements agree closely with those of *Œ. lessoni*, both from dried skins in the museums of the Philadelphia Academy and Smithsonian Institution, and as taken by Dr. Kidder from the recent specimens. These young birds were found on Kerguelen Island as early as September 15, living in deep burrows in hill-sides. At about the same time, an adult specimen was brought into camp by one of the men attached to the party, with the statement that it had been found with young, but was unfortunately not preserved, and the old birds were not found again until December 29, in a burrow without egg or young. It will be remembered that *Œ. kidderi*, the only other species of the genus known to be found on the island, was taken with egg on October 21, and is thus excluded from consideration. From the Proceedings of the Philadelphia Academy for 1866,† we extract the following description of the young of *Œ. lessoni*: —

"No. 15709, Smiths. Register, Terra del Fuego, T. R. Peale.—Entire upper parts dusky fuliginous-brown; the dorsal feathers usually with somewhat light margins; the color deepening on the wings and back into brownish-black. Some of the secondaries, tertials, and upper coverts have a slight cinereous tinge. On the head and nape, the brown is lighter than elsewhere; and a somewhat diluted shade of this color extends adown the throat, thus completely enveloping the head, and occupies likewise the upper half of the breast, quite across, as well as all the sides under the wings. On the crissum, and especially on all the under tail-coverts, except immediately around the anus, the color again deepens into brownish-black. The rest of the under parts are white. The circumocular region is darker than the adjacent parts.

"The foregoing is the most immature plumage known to me, and it will be noticed that not only the colors themselves, but the pattern of coloration, is radically distinct from those of the adults. In some specimens *is recognizable a faint shade of a darker color on the tips of the feath-*

* *Op. cit. vide* note to p. 1 of this report.

† Critical Review of the Family Procellariidæ, part iv, by Dr. E
p. 144.

ers of the otherwise white under parts; whence I infer that in very young birds the whole under parts may be brownish or grayish."

In the more advanced of the two specimens preserved (original No. 62), the entire body is as black as a crow. On the breast, however, and under parts generally, the bases of the feathers show white to near the ends, while upon the crissum and about the head they are grayish. The surmise of Dr. Coues, therefore, with regard to the young plumage, was in the right direction, but did not go far enough. The indications of an adult white and gray plumage are unmistakable.

The very young birds first found were completely covered, as is usual in the family, with slate-colored down. The same covering is plentiful upon the younger of the two specimens preserved (original No. 66), and still distinct upon the elder.

Below are contrasted three sets of measurements, viz: those of adult skins by Dr. Coues, and the young of the same from recent specimens by Dr. Kidder:—

Smithson No.	Orig. No.	Sex.	Length.	Ext.	Wing.	Tail.	Bill.	Head.	Tarsus.	Hind toe.	Longest claw.	Remarks.
.....	.....	.....	.....	.....	11.75	5.25	1.50	.....	1.65	2.00	0.50	Adult skin (Coues).
60969	211	♀	18.15	43.00	12.15	5.85	1.50	2.50	1.85	2.20	0.50	Adult, recent (Kidder).
.....	62	.....	16.00	38.75	12.00	5.40	1.40	2.50	1.65	2.10	0.40	Young, recent (Kidder).

It should be noted that the measurements of tail, bill, head, tarsus, middle toe, and claw of the last specimen were taken from the skin, and are therefore not "recent."

ŒSTRELATA KIDDERI, *Coues.* (p. 28.)

Nests in deep burrows excavated in a hill side, each burrow containing a little pool of fresh water near its entrance. Egg is single, dull white, and very obtusely ovoid in shape, almost as globose as a Penguin's egg; first found October 11. Shell is thin, brittle, of compact structure, and marked externally by very shallow linear depressions, discernible only by aid of a lens. There are no color-markings.

The measurements are as follows:—

Smithson. No.	Orig. No.	Measurements.
17157	35*a*	2.18 × 1.77
17158	35*b*	2.20 × 1.75
17159	35*c*	(Broken.)

A young bird taken December 13, and much resembling that of *Œ. lessoni*, but far less advanced than the latter at that date, was then attributed to this species, although, the old bird not having been taken at the same time, the evidence was not positive. It made no sound when taken from its burrow. Subsequent examination of the specimen fully confirms this surmise. The bird is still covered with pale slaty down; but the shape of the bill, and especially its narrowness from base to tip, taken in connection with the dates, place the identification beyond a reasonable doubt.

OCEANITES OCEANICA, (*Kuhl*) *Coues.* (p. 30.)

Nests under rocks, usually on pretty high land, laying a single white egg. There are no eggs in the collection; but one was found by Rev. Mr. Eaton, of the English party, on Thumb Mountain, some fifteen miles from the American station, December 8.

PROCELLARIA NEREIS, (*Gould*) *Bp.* (p. 31.)

Nests under tufts of grass, or other low herbage, near the sea. Sometimes it digs a small burrow; oftener the eggs are found simply covered by overhanging grass-stems, in low land. The egg is single, compact in structure, smooth, and very fragile, ellipsoidal in form, and white, excepting at the larger end, which is marked by a collection of small reddish spots interspersed with a few specks of very dark brown. If we are correct in our impression that the markings about the butts of these eggs are not adventitious, we have here an exception to the general rule that the *Procellariidæ* lay white eggs. In size, shape, and coloration, the egg recalls some of the least-spotted examples of that of the common Meadow Lark (*Sturnella magna*). By aid of the lens are to be seen a few pore-like punctations, widely scattered.

The measurements are as follows:—

Smithson. No.	Orig. No.	Measurements.
17194	157	1.30 × 0.95

We have no information concerning the young of this species, none having been hatched at the time of breaking up the American station (January 11).

PSEUDOPRION DESOLATUS, (*Gm.*) *Gray.* (p. 32.)

Nests in the same localities and the same habits as *cærulea* (q. v.).

HALOBÆNA CÆRULEA, (*Gm.*) *Bp.* (p. 34.)

Nests in deep tortuous burrows in hill-sides near the sea. Egg is single, ovoidal, and dull white, without color-markings. In the specimens measured, there is, however, as shown by the figures, the usual range of variation in contour. They remind one, in size and shape, of the eggs of a bantam hen. Shell is thin, homogeneous, and compact in structure, presenting under the lens a finely granular external surface. First found October 23.

The measurements are as follows:—

Smithson. No.	Orig. No.	Measurements.
17161	49*a*	2.00 × 1.50
17162	49*b*	2.08 × 1.44
17163	49*c*	2.09 × 1.57
17164	49*d*	2.00 × 1.45
17165	49*e*	1.90 × 1.50
17166	49*f*	1.96 × 1.47
17167	49*g*	1.92 × 1.48
17168	49*h*	2.10 × 1.46
17169	49*i*	1.95 × 1.48
17170	49*j*	2.07 × 1.54
17171	—	2.02 × 1.45
17171*a*	41	1.91 × 1.52
17172	63	2.08 × 1.43
17173	71	1.90 × 1.47

The newly-hatched young have bill and toes slaty blue, with apparently pale-yellowish webs and brownish-black claws. The horny speck upon the bill is whitish, and situated high above the tip of the bill. The region about the base of the bill is largely denuded. They begin to hatch about November 12.

PELECANOIDES URINATRIX, (*Gm.*) *Lacépède*, (p. 36.)

Lays one egg in a burrow in the hill-side, generally selecting the same locality as *Haloœbna cærulea*. Burrow is straight, slanting slightly downward, and less deep than that of *Halobæna*. Egg is a regular ovoid, tending in some specimens to ellipsoidal. First found December 10. Shell is white, thin, brittle, compact, and homogeneous in structure. No color-markings.

The measurements are as follows:—

Smithson. No.	Orig. No.	Measurements.	Remarks.
17191	190*a*	.....	Badly broken.
17192	190*b*	1.62 × 1.15	Broken.
17193	190*c*	1.62 × 1.27	
17174	136	1.66 × 1.26	
17190	152	1.65 × 1.25	

No young birds were found during the visit of the American party to the island.

APTENODYTES LONGIROSTRIS, *Scop.* (p. 39.)

No eggs or young in the collection. It is of this genus that the statement is made that the eggs are incubated in a sort of pouch, formed of a fold of skin, and situated between the tibiæ. The whalers met at Kerguelen Island confirm this statement; but no opportunity for direct personal observation was found during the stay of the transit-party. The male and female are said by the whalers to alternate in carrying the egg around.

PYGOSCELIS TÆNIATA, (*Peale*) *Coues.* (p. 41.)

Had already begun to lay September 10, selecting the top of a mound of *Azorella* (a densely-growing plant common on the island), and scratching therein a shallow cavity. But one egg was found at any time in a nest; yet we have good reason for believing that these Penguins rear two young in a season, laying a second egg about two months after the first, and before the young bird has left the nest. The eggs are obtusely ellipsoid, some specimens being almost spherical; white, with a very pale greenish tint. The shell is thick, inelastic, and friable, covered by a thin layer of calcareous matter that looks precisely as if it had been daubed on with a coarse brush. The specimens preserved, being from a rookery which has been often robbed, are doubtless smaller and thinner-shelled than those of the first laying.

The measurements are as follows:—

Smithson. No.	Orig. No.	Measurements.
17112	5	2.50 × 2.08
17113	6	2.61 × 2.00
17114	7	2.52 × 2.17
17115	8	2.42 × 2.05
17116	9	2.68 × 2.18
17117	10	2.32 × 2.10
17118	11	2.70 × 2.20
17119	12	2.69 × 2.18
17120	13	2.58 × 2.10
17121	14	2.40 × 2.18
17122	15	2.49 × 2.18
17123	16	2.45 × 2.17

Young birds were found just breaking the shell December 4. They are hatched much earlier when the rookeries are not so often robbed: as early as October 12, certainly. When first hatched, the young are covered with soft, hairy, pearl-gray down. Head black above and behind; bill flesh-colored; feet black on the soles and flesh-colored above.

EUDYPTES CHRYSOLOPHA? *Brandt.* (p. 45.)

Begins to lay about the first of December, building among fallen rocks by the sea, making nests which are more complete than those of *Pygoscelis tæniata*, and lining them with dried grass. There are two eggs to a nest, white, with a faint tinge of greenish, obtusely ovoid in shape, and usually one is distinctly larger than the other. The shells are thick, friable, inelastic, and often smeared in parts with calcareous deposit. The external surface is punctured by minute pores, scattered widely apart, but presents no distinct surface-marking.

The measurements are as follows:—

Smithson. No.	Orig. No.	Measurements.
17124	—	2.83 × 2.05
17125	—	2.60 × 2.07
17136	*124*c*	2.56 × 1.88
17137	124*a*	2.89 × 2.16
17138	124*b*	2.39 × 1.92
17139	124*c*	2.79 × 2.20
17140	124*d*	2.50 × 1.79
17141	124*e*	3.04 × 2.18
17142	124*f*	2.52 × 1.89
17143	124*g*	2.84 × 2.12
17144	124*h*	2.58 × 2.00
17145	124*i*	2.80 × 2.30
17146	124*j*	2.58 × 1.93
17147	124*k*	2.80 × 2.11
17148	124*l*	2.81 × 2.02
17126	134*a*	2.94 × 2.15
17127	134*b*	2.82 × 2.19
17128	134*c*	2.95 × 2.15
17129	134*d*	2.83 × 2.10
17130	134*e*	2.32 × 1.80
17131	134*f*	2.82 × 2.04
17132	134*g*	2.50 × 1.99
17133	134*h*	2.86 × 2.10
17134	134*i*	2.82 × 2.15
17135	134*j*	2.70 × 1.95
17160	—	2.52 × 1.80

* Original number duplicated.

EUDYPTES DIADEMATUS, *Gould.* (p. 47.)

We have no direct information concerning the nesting or eg these birds. Whalers report that their habits in these respect precisely similar to those of *E. chrysolopha*, as was to be expected.

BOTANY.

.—PHÆNOGAMIA, FILICES, ET LYCOPODIACEÆ.

REVISED BY PROF. A. GRAY.

I.—RANUNCULACEÆ.

1. RANUNCULUS CRASSIPES, *Hook. fil.*—Very common in and by esh-water pools, and pretty well up on the hill-sides, among *Acæna*, d in crevices of wet rocks. Varies greatly in size and vigor of owth in different localities. Begins to flower about December 15.

2. RANUNCULUS TRULLIFOLIUS, *Hook. fil.*—In small pools and nning streams of fresh water. Not uncommon, but not found in wer. In two forms [the larger answering well to Dr. Hooker's cimens from the Falkland Islands; the smaller, with some entire ves apparently much too near *R. hydrophilus*, Gaud. Neither of two were before recorded from Kerguelen Island.—A. G.].

. RANUNCULUS ——— ?—In low land, between two arms of the . Not in flower up to January 2. Found in company with *R. ssipes*, which here grew much more luxuriantly than near the sta- n (among the hills). [A succulent species, with rounded and some- at caudate leaves, an inch or more in diameter, deeply and obtusely -lobed, on fleshy petioles a span or more long. It can hardly be a n of the preceding.—A. G.]

II.—CRUCIFERÆ.

. PRINGLEA ANTISCORBUTICA, *R. Brown*.—"Kerguelen cabbage" ws abundantly near the sea-shore, and I have seen it as high as 00 feet (Mount Crozier), where all other Phænogams but *azorella* had en place to Mosses and Lichens. Perennial, stout creeping rhizomes, metimes 5 or 6 feet long and as many inches in diameter, stated by . Hooker to be apetalous, on the authority of Mr. Anderson, who ited Kerguelen with Captain Cook (*"petala nulla!" Fl. Antarctica*),

but I have found very many flowers with a single petal, clawed and faintly pink-tinted at the large end; many with two, some with three, and a few with four petals. They fall early and are easily overlooked when present. Axillary flowers are more frequently petalous than those crowded together upon the spike-like raceme. Observed to be in flower November 2. The leaves were eaten, as cabbage, by ourselves and the ship's company of the Monongahela with relish; our fowls were fond of them, and they constituted the staple food of the live stock brought to the island by the English party and the Monongahela.

III.—CARYOPHYLLEÆ.

COLOBANTHUS KERGUELENSIS, *Hook. fil.*—Found with ripe fruit January 2, growing in both high and low land, among loose gravel and between stones.

IV.—PORTULACEÆ.

1. LYALLIA KERGUELENSIS, *Hook. fil.*—Grows by preference on the sides of stony hills, almost always the southwest side, where it is exposed (by rapid drainage and heavy rains) to frequent alternations of dryness and moisture. Root thick, long, fleshy, and partly exposed above ground. One specimen was found straddling a good-sized stone, sending down roots on all sides. Flowers were first observed December 14, and the plant was already in seed December 21, when no flowers could be found. The flowers are not "very inconspicuous," as Dr. Hooker supposed they might be. They are plentiful, although apetalous, and prominent as to their stamens and pistils, lending a pale yellowish-green bloom to the mound which the plant forms, and quite conspicuous enough to attract the attention of the casual observer. Neither can the plant be properly said to be "very local," in this part of the island at least, since, although rare, many are usually found collected together in the same place. [Dr. Hooker's specimens had only the capsules and calyx. With the present complete specimens, the whole structure of the flower is made out. The sepals are four, thin, somewhat petaloid, oval, nearly unconnected. Petals none. Stamens three, hypogynous or nearly so, larger than the calyx, two of them alternate with sepals, and one before a sepal; anthers didymous, two-celled. Style larger than the ovary, two-cleft at summit, the lobes linear, stigmatic for the whole length of the inner face. Ovules two or three from the base of the cell, campylotropous. Utricle fleshy, coriaceous, apiculate with the persistent base of the style, apparently indehiscent. Seeds two or three. Testa small.—A. G.]

ONTIA FONTANA, *L.*—Flowers were first observed December 7. among gravel, near the sea, and (as remarked by Dr. Hooker) always very near *Callitriche verna* and *Ranunculus crassipes.*

V.—ROSACEÆ.

ÆNA AFFINIS, *Hook. fil.*—"Kerguelen Tea." The leaves have derable reputation among the whalers as a febrifuge and anti- c. They are used as an infusion, hence the trivial name. nt everywhere, especially on northeast hill-sides near the sea ow land. In the flowering state, the specimens accord well with *dscendens*, as described and figured by Dr. Hooker; but in fruit acters relied upon to distinguish the two become quite apparent.

VI.—HALORAGEÆ.

LLITRICHE ANTARCTICA, *Engelm. in Hegel MS. Syst. Callitr.* (*C. Hook. fil, Fl. Antarc.*).—Grows in wet places, generally in with *Ranunculus crassipes*, often under water or beneath precip- ks overhanging and limiting rocky sea-beaches. Flowers first December 17. *Montia fontana* is generally to be found near at

VII.—CRASSULACEÆ.

LLIARDA MOSCHATA, *D'Urv.*—Small, white, perfect, regular, ous flowers, first observed in bloom December 18. Pistils and ood-red. Plentiful in crevices of rocks overhanging and closely ring to the sea.

VIII.—UMBELLIFERÆ.

ORELLA SELAGO, *Hook. fil.*—One of the commonest plants, in mounds closely compacted together, often 2 to 4 feet in , and composed of the dead stalks of old plants. Owing to the of this crowding, only the surface is green, while deeply in the the old stems and leaves seem to be partly transformed into is this plant which makes walking so fatiguing on this island. sinks into the soft mass at every step, and the hillocks are so ined together that for long distances it is impossible to avoid could not find the hairs or bristles figured and described by ker as appearing upon the upper surfaces of the leaves along ation (*Fl. Ant.* p. 284). Flowers were first observed November small starry points, scattered over the mounds. They are never spicuous, and do not press well, owing to the strength and

resistance of the stems. Not pink as figured (*Fl. Ant.*), but always pale [illegible] greenish-yellow. Here and there is a patch of discolored leaves, white [illegible] or yellow.

IX.—RUBIACEÆ.

1. GALIUM ANTARCTICUM, *Hook. fil.*—A small trailing plant, found [illegible] as undergrowth with *Acæna*, Grasses, Ferns, etc., generally near the sea [illegible], but extending well up the hill-sides. Flowers first observed December [illegible] 3. "Flores sessiles, albi, trimeri" (*Fl. Ant.* p. 303). I have found them [illegible] quite as often 4-petaled as 3-petaled, and with a distinct pedunc[illegible]. A single 5-petaled flower was found January 5.

X.—COMPOSITÆ.

1. LEPTINELLA PLUMOSA, *Hook. fil.*—First observed in flower Nove[illegible]- ber 30. This plant fringes the cliffs overlooking the sea, grows do[illegible] to high-water mark in the low-land, and marks the "roads" to Pengu[illegible] rookeries and the rocks frequented by Cormorants. It grows ve[illegible] thickly, forming a flat matted carpet very welcome to the eye of t[illegible] wearied pedestrian, less on account of the silvery luster of its leaves th[illegible] because it is a certain indication of firm ground. A decoction of t[illegible] leaves is used by the whalers as an emetic, and is said to be pro[illegible] and effectual in its action.

XI.—GRAMINEÆ.

1. TRIODIA KERGUELENSIS, *Hook. fil.*—Flowers were first obser[illegible] December 2. Grows among cliffs, altitude 300 to 2,000 feet. V[illegible] long, filiform roots.

2. FESTUCA COOKII, *Hook. fil.*—Very common in hollows on hill-si[illegible] near the sea. Flowers early in May. A fine large grass. [The pla[illegible] seem to be male only; if fertile, they are in a much earlier state of inflorescence than Dr. Hooker's specimens.—A. G.]

3. FESTUCA ERECTA, *D'Urv.*—A straight, tussocky grass, with purple panicles, observed in flower December 6. Found in flat land, altitude 200 feet, about a mile from the sea.

4. AIRA ANTARCTICA, *Hook.*—A graceful grass, with oat-like panicles. Found in flower near the sea-shore December 21. Also observed among cliffs at considerable altitudes.

XII.—FILICES ET LYCOPODIACEÆ.

1. LOMARIA ALPINA, *Hook. fil.*—Dr. Hooker mentions this Fern as "very scarce". We found it exceedingly common; mostly barren.

2. POLYPODIUM (GRAMMITIS) AUSTRALE.—In crevices of rocks; rare. New to Kerguelen Island.

3. POLYPODIUM VULGARE.—Crevices of rocks by running streams; altitude 200 feet and upward. Abundant. New to the island.

4. CISTOPTERIS FRAGILIS.—Not common. Crevices of rocks near hill-tops. [* No specimens in the collection.—A. G.] New to the island.

5. LYCOPODIUM SELAGO, *Linn.*—Rare.

6. LYCOPODIUM CLAVATUM (var. MAGELLANICUM).—More common, but very local.

B.—MUSCI.

DETERMINED BY THOMAS P. JAMES, ESQ.

1. ANDREÆA MARGINATA, *Hook. fil. & Wils.* Fl. Antarc. ii, p. 396, t. 151, f. 1.—On high rocks, 1,500 feet altitude.

2. CERATODON PURPUREUS, *Brid.* Br. Univers, i, p. 480.—In a variety of forms; very common.

3. GRIMMIA FRONDOSA, *James, sp. nov.*—"Laxe cæspitosa valde fastigiata, ramosa, fusco-viridis, gracilis; folia erecto-patentia, concava curvata anguste lanceolata canaliculata, in pilum hyalinum sublævem terminata, costa sub pilo evanida; inferne depilia rigida acuminata; margine erecta, cellulis basi oblongis laxioribus flavidis et usque medium folii quadratis superne remotis subrotundis versus apicem obscuris."

Growing with *Andreæa marginata;* found only in a barren condition.

4. GRIMMIA KIDDERI, *James, sp. nov.*—"Compacte globosa, pulvinata, pusilla fastigiata, ramosissima, atrato-viridis, rigida; folia caulina densissima, erecta patentia anguste lanceolata, inferiora canaliculata acuminata strictiuscula superiora elongata curvula in pilum brevem hyalinum sublævem producta; nervo ad basin lato infra apicem evanido margine erecta, cellulis basi angustis elongatis flavidis pellucidis superne sensim quadratis minutis subopacis."

Growing in small globular masses on hill-sides at some distance from the sea. The small balls formed by this curious moss seem not to be rooted to any other plant, but to be blown about by the wind indiscrim-

* Probably lost in transportation. The identification was given me by Rev. A. E. Eaton, of the English transit-party.—J. H. K.

inately. The detached masses generally were found disposed in a fan-shape, radiating apparently from a central point, as if a larger mass in which they had been aggregated had been broken up by the force of the wind. Found only in a barren state. Very local.

5. RACOMITRIUM LANUGINOSUM, *Brid.* i, p. 402, t. 152.—Abounds on high rocks.

6. ORTHOTRICHUM CRASSIFOLIUM, *Hook. fil. & Wils.* l. c. p. 125, t. 57, f. 8; var. *β. acutum*, C. Müll. Syn. i, p. 691.—This plant is monoicous, the male gemmæ being found terminal on separate, many-branched plants; also at the base of the female plants.

7. WEBERA CRUDA, *Schreb.* Spic. Fl. Lips. p. 83.—In the shade of, and in the crevices of rocks; appearing in many forms.

8. WEBERA ALBICANS, *Whlb.* Fl. Lips. p. 353.—In wet, mostly spring[illegible]gy places.

9. WEBERA NUTANS, *Schreb.* l. c. p. 81, var. *β. cæspitosa.*—In wet situ[illegible]u-ations on mountain-sides.

10. WEBERA NUTANS, *Schreb.* var. *γ. bicolor.*—In shady places near th[illegible]he sea.

11. BRYUM WARNEUM, *Bland.* in Brid. p. 675.—Growing with *Bryu[illegible]m bimum.* Not common.

12. BRYUM GAYANUM, *Mont.* in litt. C. Müll. Syn. i, p. 267.—Rare[illegible]e.

13. BRYUM BIMUM, *Schreb.* l. c. p. 83.—Common in wet and bog[illegible]gy places.

14. BRYUM TORQUESCENS, *Br. & Schp.* Bry. Eur. fas. 6-9, p. 49, [illegible]t. 20.—From the rear of the transit-house, near the sea.

15. BRYUM PALLESCENS, *Schwaeg.* Sup. i, ii, p. 107, t. 75.—In dau[illegible]mp situations.

16. BRYUM ARGENTEUM, *Linn.* Sp. Pl. p. 1586.—On exposed roc[illegible]ks and on bare ground.

17. BARTRAMIA PATENS, *Brid.* Sp. Mus. iii, p. 82.—Among shad[illegible]d rocks.

18. BARTRAMIA FLAVICANS, *Mitt.* in Hook. Kew Jour. iii, 55.—Re[illegible]ar of the transit-house, among rocks.

19. BARTRAMIA APPRESSA, *Hook. fil & Wils.* Fl. Nov. Zel. 89, t. 86, f. 5 = *B. exigua*, Sulliv. U. S. Exp. Exped.

20. CATHARINA (ATRICHUM) COMPRESSA, *C. Müll.* Syn. i, p. 95.—*Polytrichum compressum, Hook. fil. & Wils.* l. c. ii, p. 410, t. 153.—On hill-sides upon wet rocks.

21. PLAGIOTHECIUM DONIANUM, *Sm.* Eng. Bot. i, 1446.—*Hypnum den-*

ticulatum, Linn.—*H. obtusum*, Whlb.—On shaded ground, with *Webera cruda*.

22. HYPNUM GRACILLIMUM, *Hrsch.* Fl. Bras. i, p. 78.—Found deep in the interior of a small dark cavern in a rock; 300–400 feet altitude; caves had been tenanted by birds.

23. HYPNUM UNCINATUM, *Hedw.* Musc. Fr. iv, p. 65, t. 25.—Abundant on hill-sides, among and on the sides of *azorella* mounds.

24. HYPNUM FLUVIATILE, *Sw.* Musc. Suec. p. 63.—On wet and damp rocks in rear of transit-house, and other localities.

25. HYPNUM FRIGIDUM, *C. Müll.* in Bot. Zeit. 1856.—Growing with *Bryum Warneum*.

26. HYPNUM LECHLERI, *C. Müll.* l. c. 456, 1856.—On low ground.

27. HYPNUM FLUITANS, *Linn.* Fl. Suec. p. 1074.—In fresh water and among bogs.

28. HYPNUM RIPARIUM, *Linn.* Sp. Pl. p. 1596.—Growing with *Ranunculus crassipes* in wet places.

C.—LICHENES.*

DETERMINED BY PROF. EDW. TUCKERMAN.

The Lichens of this island were first observed by Dr. J. D. Hooker during the voyage of the Erebus and Terror (1839–1843), and his specimens were studied by Dr. Thomas Taylor, according to whose reckoning (Lich. Antarct. in Lond. Journ. Bot. 3, p. 634) the whole number of species was sixteen. Dr. Taylor's herbarium is now included in that of the Boston Society of Natural History, but contains unfortunately very little to illustrate his Kerguelen determinations; and the lack of microscopical analysis makes it difficult, therefore, to avail ourselves of his work.

The collection now before me, made by Dr. Kidder, naturalist of the United States Transit Expedition of the present year, contains more or less satisfactory evidence of as many as twenty species, though not all of them determinable. Adding the three found in the Taylor herbarium, the whole number, according to this reckoning, will be twenty-three. And as eight or nine others are found in Taylor's list, there is no doubt that this little Lichen-Flora is larger than it was taken to be.

1. USNEA SULPHUREA, *Müll.* Th. Fr.—*U. melaxantha*, Ach.—Rocks.—According to Taylor, the place of this well-known antarctic lichen is Kerguelen's Land by another, the *U. Taylori*, J. D. Hook.,

* From the Bulletin of the Torrey Botanical Club, October, 1875, pp. 57–59.

called "handsomest of the vegetable products of this the island of Desolation". But this last, though received by Nylander (*Neuropogon Taylori*, Nyl. Syn. i, p. 273), is hardly well discriminated from the older species by the description of either author; and I cannot separate any of the numerous specimens before me from others got, during the same voyage, at the Falkland Islands (Herb. Hook.), which Taylor and Nylander appear to have referred to *U. melaxantha*.

2. PANNARIA TAYLORI, *sp. nov.*—Thallo foliaceo cartilagineo appresso luteo-fulvo, lobis apice rotundatis crenatis incisisque, subtus nigris hypothallo obsolescente; apotheciis (demum plusquam 2 millim. latis) lecanorinis sessilibus, margine crasso ruguloso, disco plano fuscescente. Sporæ ellipsoideæ, simplices, incolores, 0,016–21^{mm} long. 0,009–11^{mm} crass.—Rocks, *Hooker* (Herb. Taylor).—Medullary layer of compact, elongated cells. Collogonidia 0,002–5^{mm} in diameter, solitary or in chains of 2–5. The specimen is rather more than an inch across. It occurs with *Placodium elegans*, but wrapped apart, in Dr. Taylor's collection.

3. PANNARIA GLAUCELLA, *sp. nov.*—Thallo foliaceo cartilagineo arcte appresso glauco-cinerascente, subtus pallido hypothallo obsoleto, lobis radiantibus subintegris; apotheciis (0^{mm}. 006–8 latis) lecanorinis adnatis, margine integro demisso, disco dein convexo fusco-nigro. Sporæ immaturæ.—Rocks.—Specimens scarcely half an inch across. Elongated cells of medullary layer compact. Collogonidia 0,004–9^{mm} in diameter, in chains often of 4–10.

4. PLACODIUM ELEGANS, *Link.* D. C.—Rocks, *Hooker* (Herb. Tayl.).—Spores 0,010–17^{mm} long and 0,007–9^{mm} thick. Called *Lecanora murorum* by Dr. Taylor (Herb.), but not reckoned in his Lichenes Antarct. l. c. It is perhaps better referable as above.

5. PLACODIUM BICOLOR, *sp. nov.*—Thallo crustaceo-adnato rimoso-areolato aurantiaco, cephalodio centrali (6–10^{mm}. lat.) pluribusve depressis radiatim rimosis, concoloribus onusto, ambitu lobato; apothecii (2–3^{mm}. lat.) sessilibus, disco plano nigro-fusco, margine tenui demisso subintegro. Sporæ in thecis uniserialiter octonæ, ellipsoideæ, polaribiloculares, 0,020–30^{mm} lat., 0,012–20^{mm} crass., paraphysibus capillaribus.—Rocks.—Collogonidia of the cephalodia 0,006–9^{mm} in diameter, reddish, solitary or in short chains. The name and much of the character of *Lecanora dichora*, Tayl., l. c., suggests the present lichen; but the infertile specimen, called (notwithstanding its orange color) *Lecanora gelida* by Taylor (Herb.), appears to me to belong here. Thallus at length two inches wide.

6. LECANORA GELIDA, *L.* Ach.—Rocks.—Thallus and cephalodia stouter than I have seen them in the northern lichen. Spores 0,015–23^{mm} long and 0,006–12^{mm} thick.

7. L. HAGENI, *Ach.* Koerb.—Rocks.—Several minute, lecanorine apothecia with white, crenate margins, appear to belong here, but have afforded no sufficient analysis. Taylor reckons *L. subfusca* in his list.

8. L. MACROPHTHALMA, *Tayl.* Nyl. Urceolaria, Tayl. l. c., Lecanora, Nyl. in Flora, 1858 cit. Krempelh.—Rocks.—Thallus like that of *L. gelida*, with which it agrees in possessing similar, but more depressed, cephalodia; being the third lichen thus curiously characterized in this small collection. The apothecia are externally best comparable with those of *Lecidea endochlora* (Tayl. sub Urceolaria), but the lichen is probably to be referred to the sect. Aspicilia; though spermogones have not been observed. Thalli exceeding two inches in width.

9. URCEOLINA, *Geng. nov.*—Apothecia urceolata, excipulo proprio albido connivente discum rubrum submarginante, margine thallino evanido. Sporæ ellipsoideæ, incolores. Spermatia acicularia, arcuata, sterigmatibus subsimplicibus. Thallus crustaceus, effiguratus.

URCEOLINA KERGUELIENSIS, *sp. nov.*—Thallo crustaceo adnato areolato-verrucoso aurantiaco-fuscescente, verrucis gibbosis centroque substipitatis in ambitum effiguratum coalescentibus; apotheciis (circ. 1^{mm}. lat.) immersis, margine proprio tenui pallido v. dein livido-nigrescente. Sporæ in thecis uniserialiter octonæ, simplices, limbatæ, 0,021–30^{mm} long., 0,015–20^{mm} crass., paraphysibus filiformibus.—Rocks.—Specimen scarcely two inches in diameter. Whole habit of the pale-ash-colored young thalli that of similar thalli of *Lecanora chlorophana;* but the wart-like areoles becoming a little stalked, and the color finally making as close as possible approach, in the brown series, to dirty-orange in the lemon-colored. More or less radiation is evident in the arrangement of the warts toward the margin, which becomes lobulate, and the extreme edge blackish. Habit of apothecia that of *Urceolaria scruposa* with undeveloped thalline margin. The lichen is not referable to *Lecanora* § *Aspicilia*, and is excluded by its exciple from § *Squamaria*.

10. CLADONIA PYXIDATA, *L.* Fr.—On the earth.

11. BIATORA RUBELLA, *Ehrh.* Rabenh.—Apothecia varying no little in color and size, but all referable to the v. *inundata*, Nyl. (Hepp. Eur. n. 289), as that is represented in North America. Spores 0,030–46^{mm} long and 0,0015–25^{mm} thick. Reaction of hymenial gelatine with iodine violet.

12. LECIDEA ENTEROLEUCA, *Fr.*—On dead grasses.

13. L. ENDOCHLORA, *Tayl.* sub Urceolaria.—Rocks. (Herb. Tayl.)

14. L. FUSCO-ATRA, *Ach.*, Fr.—Rocks.—And traces occur of three other *Lecideæ*.

15. BUELLIA PARASEMA, *Ach.*, Koerb.—Rocks.

16. B. STELLULATA, *Tayl.*, Br. and Rostr.—Rocks.

17. B. GEOGRAPHICA, *L.*—Rocks.

18. SAGEDIA CHLOROTICA, *Ach.*, Mass.—And there are insufficient traces of two other *Verrucariei*.

ALGÆ.

DETERMINED BY DR. W. G. FARLOW.

1. D'URVILLÆA UTILIS, *Bory.*

2. D'URVILLÆA HARVEYI, *Hook.*

Two large specimens of what seems to be this species were brought home by Dr. Kidder. In the *Flora Antarctica*, the only species of *D'Urvillæa* mentioned as found in Kerguelen's Land is *D. utilis*, but, in the two specimens above mentioned, the perforations of the root correspond clearly to the description given of *D. Harveyi*.

3. DESMARESTIA VIRIDIS, *Lam. x.*!—Apparently very common.

4. MACROCYSTIS PYRIFERA, *Ag.*—Partly of the typical form, partly the var. *luxurians* of the *Flora Antarctica*.

5. ADENOCYSTIS LESSONII, *H. & H.*

6. SPHACELARIA FUNICULARIS, *Mont.?*—Quite a number of specimens, too small for accurate determination, probably belong to this species.

7. RHODOMELA GAIMARDI, *Mont.*—A single specimen of this species was collected by Dr. Kidder. This species is new to Kerguelen's Land, the nearest recorded station being the Auckland Islands.

8. DASYA (POLYSIPHONIA, *H. & H.*) BERKLEYI, *Ag.*—Apparently very common.

9. PTILONIA MAGELLANICA, *Ag.*—Fine specimens in fruit.

10. DELESSERIA LYALLII, *H. & H.*

11. NITOPHYLLUM LIVIDUM, *H. & H.*

12. NITOPHYLLUM FUSCO-RUBRUM, *H. & H.*

13. RHODYMENIA PALMATA, *Grev.*

14. RHODYMENIA CORALLINA, *Gr*

15. RHODYMENIA VARIOL

16. GIGARTINA R

17. CALLOPHYLLIS VARIEGATA, *Ag.*

18. CERAMIUM RUBRUM, *var.* SECUNDATUM, *Lyngb.*

19. BALLIA CALLITRICHA, *Ag.*

20. CALLITHAMNION PTILOTA, *H. & H.*—New to Kerguelen's Land; previously recorded at the Crozet Islands.

21. CODIUM ADHÆRENS, *Ag.*—New to Kerguelen's Land; a not uncommon species of Europe.

22. ULVA LATISSIMA, *L.*

CROZET FLORA.

From some specimens preserved by officers of the Monongahela, when that ship visited Possession Island, the largest of the Crozets, on its way to Kerguelen, I have been enabled to identify the following-named plants as common to both islands:—

1. PRINGLEA ANTISCORBUTICA.—Growing much less luxuriantly than on Kerguelen Island.

2. ACÆNA AFFINIS.

3. AZORELLA SELAGO.

4. GALIUM ANTARCTICUM.

5. LEPTINELLA PLUMOSA.

6. LOMARIA ALPINA.

7. A moss believed to be ANDREÆA MARGINATA.

8. Also "a small vine, with blue flowers, growing among scoriæ." No specimens preserved.

GEOLOGY.

The following is a list of the collection of minerals from Kerguelen Island, determined by Dr. F. M. Endlich, geologist to the Smithsonian Institution:

Smithsonian No.

9376. *Basalt;* containing decomposed *olivine* and small white crystals of *chabazite.*

9377. *Basaltic rock.*

9378. *Basaltic rock* decomposed. The red color is due to the presence of ferric sesquioxide.

9379. *Basaltic rock* decomposed. Stained by ferric sesquioxide.

9380. *Basaltic rock* decomposed. Stained by ferric sesquioxide.

9381. *Basaltic rock*, very compact.

9382. *Basalt;* containing small white crystals of *chabazite* in vesicles.

9383. *Basalt*, vesicular, with small crystals of *chabazite* and dark brown *olivine.* The red color of the portions exposed to atmospheric influences is due to decomposing *magnetite.* It contains also some *augite* in small particles.

9384. *Basalt*, slightly vesicular, containing *augite*, yellow *olivine*, and *chabazite.*

9385. *Basalt* with *olivine.*

9386. *Basalt* with large geodes of *olivine*—typical *olivine* color.

9387. Vesicular *basalt*, the vesicles being drawn out during the flow before rigidity of the material had occurred.

9388. *Chabazite* in *basalt.*

9389. *Basalt* coated with carbonate of lime, the result of the decomposition of its constituent minerals.

9390. *Basalt* with amygdules of *calcite* and crystals of *chabazite* and *augite.*

9391. *Basalt* with amygdules of *calcite* and crystals of *chabazite* and *augite*.

9392. *Calcite*, radio-columnar.

9393. *Dolerite*. A volcanic rock related to *basalt*, containing *olivine* and *labradorite*.

9394. *Aragonite*. Large radio-columnar colorless crystals found in deep pockets in *basalt*.

SUMMARY.—"The volcanic rocks of the region examined contain a limited number of zeolitic species, and some carbonates, as epigene products. The main rocks are *basalt* and *dolerite*, of uniform physical character and constancy of inclosed minerals."

The foregoing list represents fairly the constitution of the surface-rock in the southern part of Kerguelen Island. The streams had cut their way deeply in places, exposing extensive surfaces of rock; but diligent search along these water-courses failed to disclose any stratified or fossiliferous beds. At the northern end of the island, however, in the neighborhood of Christmas Harbor, stratified rocks are abundant, with extensive deposits of coal (of poor quality), and contain many trunks of petrified trees. For a specimen of these last I am indebted to Mr. R. P. Maynard, bearer of dispatches on board the United States steamer Monongahela; my own observations having been confined to the neighborhood of the head of Royal Sound, at the southern end of the island.

Sealers and whalers say that there is a great glacier in the middle of the island, extending in a general easterly and westerly direction, and reaching quite to the sea on the western coast. It is related by them that a party of fourteen French sailors, from a wrecked sealing-schooner, tried several years ago to reach the southern part of the island on foot, and that all but six perished in crossing this glacier from exposure and starvation.

The island is hilly everywhere and in parts mountainous—Mount Ross reaching an altitude of over 5,000 feet, and Mount Crozier, near the American station, about 3,000. The higher peaks are remarkably sharp and irregular in outline, quite bare of vegetation, and mostly covered with snow. Table-topped hills are frequent, as also are level plateaux or terraces of basalt, projecting from the sloping sides of the less sharply defined hills. These terraces no doubt indicate former flows of the volcanic material, but our limited field of observation did not permit sufficiently extensive investigation to determine the points of outflow.

Should the islands of that region become at any time thoroughly well known, and a similar or identical feature be observed at different points, much could be learned regarding the distribution of land in that part of the world during the later Tertiary period.

Many of the hills slope smoothly up to abruptly projecting rocky crowns of basalt. Some are quite smooth in outline, without these characteristic rocky crowns. Others, running in general southwest and northeast, are long and barrow-like, and seem to have been thrown up only or chiefly by the action of the winds, which are in this part of the world remarkable for their violence. The lee (north and east) sides of the larger hills are covered by broken rocks of all sizes, irregularly heaped together; while the weather, or south and west, sides are less rocky and covered by fine gravel.

Some ranges, especially those fronting the southeast, present abrupt cliffs, intersected by broad rock-strewn plateaux. On the tops of these cliff-walls, particularly in the small gorges that notch their crests, are frequent pillar-shaped rocks, standing alone and near together, and curiously carved, as if by the action of the wind and sand. On the higher slopes it was a common thing to find bowlders of great size resting upon flat rocks, in such a position that it seemed quite impossible for them to have rolled thither. I never succeeded in finding surface-scratches indicative of former glacial action, nor would the abruptness of the physical outline of the country agree with such a supposition. It would seem that the present hills were at first lofty and irregular projections of basalt, from which fragments have continually been broken off by the violence of the winds and the action of ice. These fragments have gradually become piled up against the bases of the hills on their lee sides until the long southeasterly slopes now existing have been built up, from which the remainder of the original rock projects as a more or less rounded crown. On the weather or southwesterly sides the approach is generally more abrupt, less marked by large bowlders, and covered by small, flat gravel, through which the bed-rock frequently crops out. Possibly accumulations of snow, filling the shallower hollows in winter and sliding down the hill-sides in summer, may have their effect in moving the bowlders above referred to. Such a body of snow still existed on Mount Crozier so late as December, which had been frozen by night and thawed by day until it had become nearly solid ice, quite capable of carrying rocks of considerable size with it should it slide down the hill-side.

In some instances the projecting rocks have become so undermined by the action of the elements as to present very remarkable outlines. An immense mass of basalt, for example, facing northwest, some four miles from our station, seemed to be held by the strength of its material alone, so far did it overhang its center of gravity; its base being deeply grooved and carved, as if by the action of the wind.

The streams are numerous, and furnish an excellent supply of pure, very cold water; sufficiently pure, indeed, to be used by the photographers. Strange to say, these streams seemed to be absolutely without animal life, perhaps owing to the extreme coldness of the water (averaging 42° Fahrenheit). Ponds are frequent on both high and low land, and often of considerable size. In many places are extensive quaking bogs, and here and there are to be seen deep pits where the surface has fallen in, sometimes to the depth of 30 or 40 feet. Quicksands, or rather mud-holes, are said by the whalers to abound, and in most unexpected places. They tell many stories of shipmates who have undertaken to explore the island and have never returned, supposed to have been swallowed up in sink-holes. Persons connected with the transit parties often got upon insecure ground, but no serious accident followed in any case.

The general aspect of the island is desolate in the extreme. Snow covers all of the higher hills, against which the abrupt outlines of their dark basaltic ridges are most clearly defined. Only along the sea-shore is a narrow belt of herbage, of which the singular Kerguelen cabbage is at once the largest and most conspicuous component. The weather is also extremely inclement, there being scarcely a day without snow or rain. Violent gales of wind prevail to an extent unknown in the same northern latitude. It was often impossible to go on foot any considerable distance from the home-station on account of the severity of the wind. Sir J. Clarke Ross tells of one of his men being actually blown into the sea, and of saving himself from a like accident only by lying flat on the ground. Little squalls called "woolleys" (willy-waws?) are particularly dreaded by the sealers. A small white sphere of cloud is seen high up on the mountain-side, and immediately comes down with immense speed and violence, often burying vessels bows under. These squalls are dangerous not only by their violence but by their nearly vertical direction. In such a squall, on the 11th September, the entire transit expedition, with many officers of the Swatara, narrowly escaped with their lives and the loss of two boats, being overtaken while on their way from shore to the ship, anchored not more than a mile away.

Following is the monthly summary of the meteorological observations:*

United States observing station, Kerguelen Island; latitude, 49° 21′ S.; longitude, 70° 15′ E.; altitude of barometer above sea-level, 130 feet.

Month.	Barometer, mean.			Thermometer, mean.			Saturation, mean percentage.			Wind, mean force.	Rain, total.
	8 *a. m.*	2 *p. m.*	8 *p. m.*	8 *a. m.*	2 *p. m.*	8 *p. m.*	8 *a.m.*	2 *p.m.*	8 *p.m.*		*Inches.*
September*	29.60	29.52	29.60	42.9	46.00	38.14	.....	.....	.....	8.1	.....
October†	29.36	29.32	29.32	41.97	41.6	34.00	.....	.....	.....	5.6	.....
November‡	29.73	29.74	29.74	44.9	50.	41.6	.855	.792	.823	5.3	2
December§	29.53	29.39	29.54	49.02	52.05	43.2	.83	.77	.84	6.45	6.3

* Snow or rain, excepting two clear days.
† Four days without snow or rain.
‡ Twelve days without snow or rain.
§ Nine days without snow or rain.

The barometer touched its highest point, 30.30 inches, on September 16 and November 17; the wind being light on both occasions, from the southward and westward, with rain on the latter date. On October 18, the day after a severe gale, the barometer fell to 28.74, the forenoon being clear with snow in the afternoon, and the wind from the southwest. Again, on October 25, the wind being light, from the northwest, with snow all day, the barometer fell to 28.72. This also was the day *after* a severe gale. As a rule, we were disposed to place more reliance upon the *steadiness* of the barometer as an indicator of good weather than upon its actual height; fierce gales, snow, and rain occurring with almost every position of the mercury, but generally preceded by either a rapid rise or a rapid fall. From the 4th of December, for example, to the 9th (the day of the transit), the barometer had fallen steadily but very slowly from 29.92 to 29.12; yet the morning of the 9th dawned perfectly clear, and one of the stillest that occurred during all of our stay. The barometer began to rise about 8 o'clock, coincidently with the appearance of heavy clouds, followed by rain in the evening.

The highest thermometers recorded were 64° at 8 a. m., September 18, and 65° at 2 p. m., December 5; the wind being northwest on both occasions. The lowest recorded was 23° at 8 p. m., September 26, with a westerly wind. On one occasion, during a night early in September, the thermometer was observed to be as low as 18°, this being the lowest temperature noted. In September the extremes of temperature 4° and 23°; in October, 54° and 27°; in November, 60½° and ¬ December, 65° and 35°.

orological register, see report to Surgeon-General of the Navy, lished by Bureau of Medicine and Surgery, 1876.

The force of the wind is figured on the scale usually employed on sea-going vessels, according to which the maximum is 12, representing the strongest possible wind, such as is experienced in a typhoon or hurricane. According to this scale the force of the wind was three times estimated to equal 11, and fourteen times 10, in violence. Such estimates are of course liable to a certain personal error on the part of the observer, but it is not probable that in this case the error lies on the side of excess. The average daily rain-fall for November was 0.205, and for December 0.252 inch, no rain-gauge having been set up previous to November. Both the rain and tide gauges were extemporaneous contrivances, constructed by Commander Ryan as soon as opportunity and leisure offered. By the latter the rise and fall of the tide were measured with considerable accuracy, and were found to vary from 3 feet to 7 feet, according to the season of the month, and partly to the direction and force of the wind. The average rise of the tide was about 5 feet.

MAMMALS.

The only land-mammal found on the island is the common mouse (*Mus musculus*), which abounds everywhere; doubtless imported by one of the earlier sealers. It builds its nest in holes in sand-banks (in one instance in the brain-cavity of the skull of a sea-elephant), lining it with dried grass-stems or bits of oakum. From the husks of grass-seeds scattered about the entrances to its burrows, I suppose these to be its principal food.

Upon Cat Island, one of those bounding Three Island Harbor, the wintering-place of the sealers, the domestic cat has, for many years, existed in a wild state. It lives in holes in the ground, preying upon sea-birds and their young, and is said to have developed extraordinary ferocity. Recent attempts to retame individuals, even when taken quite young, have always, as I am informed, failed. I was not able to visit Cat Island during the stay of the transit expedition, and therefore am unable to say whether any obvious structural signs of reversion were presented by these animals.

Rabbits, swine, and goats have been introduced upon the Crozet and some of the Kerguelen Islands from time to time, and have always thriven well. Hog Island, the westernmost of the Crozet group, is overrun with rabbits, which have also been introduced into Kerguelen by the English transit party.

In former years the Kerguelen group of islands was noted as a favorite breeding-place for the sea-elephant (*Macrorhinus leoninus*, L.). On this account it has been much frequented by sealers for the last forty years, and resorted to also by whalers as a wintering-place, on account of the great security of Three Island Harbor. The sea-elephants have been so recklessly killed off year after year, no precautions having been taken to secure the preservation of the species, that now they have become very rare. Only a single small schooner, the Roswell King, was working the island during our visit, two others and a bark working Heard's Island, some three hundred miles to the south, where the elephants are still found in considerable numbers. Probably they would long since have abandoned the Kerguelen Islands altogether but for a single inaccessible stretch of coast, "Bonfire Beach," where they still "haul up" every spring (October and November) and breed in considerable numbers. The beach is limited at each end by precipitous cliffs, across which it is quite impossible to transport oil in casks, nor can boats land from the sea, or vessels lie at anchor in the offing, from the fact that the beach is on the west, or windward coast, and exposed to the full violence of the wind.

No sea-elephants "hauled up" in the neighborhood of the American station previous to December. On the 13th of that month, while a boat's crew from the United States steamer Monongahela were waiting at a rocky beach for their officers, a small female of this species came out of the water and was captured and killed by them. It measured in length 8 feet 10 inches, and in girth 8 feet 4 inches, being enormously fat. The layer of fat beneath the skin was 4 inches deep, and the body seemed almost formless; a skin stuffed with semi-fluid fat, that quivered and trembled, when moved, like jelly. The skin was prepared and preserved, and the skeleton partly cleaned and sunk in a barrel for small crustaceans to work on. Most unfortunately, during a very severe gale about Christmas time, it was carried away by the violence of the sea and lost. Two other skins and skeletons were procured for me by captains of sealers, one of which, a fine full-grown bull from Heard's Island, said to have measured 23 feet in length, was also lost, along with fifty barrels of oil, while being rafted off to the schooner. The other, a small and immature specimen, came from the eastern Kerguelen coast, and has been brought home in safety. It was procured for me by Captain Fuller, of the schooner Roswell King. (See Nos. 15336 and 12455 National Museum Catalogue.) The dentition of this specimen is complete, but the

ossific centra of many bones, notably of the vertebræ, have not yet become united together. Prof. Theo. Gill has examined and identified the skeleton, which, with two skins, constitutes the collection of this species finally preserved.

The sea-elephant begins to "haul up" on the beaches of its breeding-places about October 10, and remains ashore until well into the month of January. The old bulls, which alone are provided with a proboscis, take charge, each, of a large number of females, guarding them from the approach of other bulls, and (so the sealers assert) prevent them from returning to the sea before the young are old enough to do so with safety. During the breeding-season the bulls are very pugnacious, fighting fiercely with each other, and even attacking the sealers themselves. Although seemingly so unwieldy, they are described as getting over the beaches with surprising speed, advancing both flippers at a time and using them like crutches. The beaches of Royal Sound are fringed by innumerable wallows—cradle-shaped pits—in which the animals lie during the breeding-season, recalling the buffalo-wallows of our western prairies.

The increasing scarcity of the sea-elephant, and consequent uncertainty in hunting it, together with the diminished demand for the oil since the introduction of coal-oil into general use, have caused a great falling-off in the business of elephant-hunting. The Crozet Islands, for example, had not been "worked" for five years, and at Kerguelen there was only one small schooner engaged in this pursuit, two others making Three Island Harbor their headquarters, but spending the "season" at Heard's Island, three hundred miles to the southward. It may, therefore, be reasonably hoped that these singular animals, but lately far on the way toward extinction, will have an opportunity to increase again in numbers, and that the sealers may learn from past experience to carry on their hunting operations with more judgment, sparing breeding females and very young cubs. When the Monongahela visited the Crozet Islands on December 1, they found the sea-elephant very numerous, although left undisturbed for only five seasons.

Besides the sea-elephant the sea-leopard, (*Ogmorhinus* leptonyx*, Blainv.) often visits the island, as do several species of seal. The sea-leopard is also sought for its oil, but is less valuable, being a much more

*This name is substituted for *Stenorhynchus*, because the latter has already been ascribed to other animals: to a crab in 1819, and to an insect in 1829. See W. Peters in *Monatsbericht der Königlich Preussischen Akademie der Wissenschaften zu Berlin, June*, 1875.

tive animal, and therefore less heavily loaded with blubber. The kin
nguin is said to be its favorite food, a statement which speaks well f
e sea-leopard's activity in the water, the penguin swimming rapid
ough of course to catch the fish upon which it feeds. The leopard
scribed as pursuing and overtaking the penguin under water, risin
the surface and tossing it into the air, so as to catch it more securely
osswise, in its jaws.

Dr. W. Peters also describes a new species of *Otaria*,* the *Arctophoca*
zella, its specific name being given in honor of the sloop of war Ga-
lle, which carried the German transit of Venus expedition to Ker-
elen Island. And Rev. Mr. Eaton, naturalist to the English expedi-
n, speaks of two "species of platyrrhine seal",† in addition to the
-elephant and sea-leopard. By our own party only four individuals
the *Phocidæ* were seen during four months' residence on the island.
o of these were thought to be sea-leopards, and two sea-elephants,
e of the latter having been captured and preserved, as above stated.
alers speak of a few scattering fur-seals upon this and Heard's
ands, but they have never been found in large numbers.

Many species of whales and porpoises abound in the neighboring
as. In the early days of whaling in the Indian Ocean, these islands
e said to have literally swarmed with whales, for which the numerous
ets and bays of the archipelago furnished secure and sheltered
eding-places. Even now this region is one of the best whale-fishing
unds of the Antarctic Seas.

FISH.

(IDENTIFIED BY PROF. THEO. GILL.)

ry few fish were collected, owing to the want of boats. Several
pts were made with set-lines from the shore, but without success.
the deck of the Swatara, September 9, was caught, with a hand-
fine specimen of *Chænicthys rhinoceratus*, Richardson, which has
reserved. (Catalogue National Museum, No. 16642.)
e were also captured, at various times, under stones on the beach,
water, small specimens of *Notothenia purpuriceps*, Rich., and
fer bispinis, Rich. On the 2d January, dredging at 5 fathoms
steam-cutter of the Monongahela, I obtained two small speci-

* Loc. cit.

† Annals and Magazine, October, 1875.

mens, one of which proves to be *Notothenia purpuriceps*, and the other (probably) *Notothenia tesselata*, Rich., hitherto reported from the Falkland Islands. Some of the dorsal rays having been injured in transportation, the diagnosis is not positive.*

The sealers reported that at times they had caught a fish of considerable size, "like a tom cod", at the outer edges of the kelp-beds; but state that fish are never very plentiful. None were found in the fresh-water streams.

A single specimen each of a species of *Gobiesox* and *Clinus* was brought from Table Bay, South Africa, having been captured on the shore.

MOLLUSKS.

By W. H. Dall, Smithsonian Institution.

CEPHALOPODA.

Octopus?

Beaks of a cephalopod, perhaps an *Octopus*, were discovered by Dr. Kidder in the stomachs of sea-birds. Also an *Octopus*, dead on the beach, after a storm, in too imperfect a condition for identification.

GASTEROPODA.

RISSOIDÆ.

Genus EATONIELLA, Dall.

Eatonia, E. A. Smith, Ann. Mag. N. Hist. xvi, ser. iv, July, 1875, 70; (*not Eatonia*, Jas. Hall, 10th Rep. N. Y. State Univ. 90, 1857; Pal. N. Y. iii, 432, 1858.)

The name *Eatonia* being pre-occupied, as above, by Hall for a genus of brachiopods, I have substituted a modified form of it which does not appear to have been used. This genus is practically a thin, smooth *Rissoina*, as far as the shell goes, apparently bearing much the same relation to *Rissoina* that *Cingula* does to *Rissoa*.

Eatoniella kerguelenensis.

Eatonia kerguelenensis, E. A. Smith, l. c. 70.

Mus. No. 11898.

The specimens, five in number, collected by Dr. Kidder at low-wate-

*Gill, Synops. Notothenioids, Proc. Phil. Acad. Nat. Sci. 1861, 591.—Ri- Ichthyology of the Erebus and Terr-

ark on fuci, show such great variations in form of aperture, acuteness the spire, and general proportions, that I am unwilling to describe em as new, though the diagnosis of Mr. Smith does not seem in all spects applicable to them. None of them exceed four and a half ıorls in extent, the aperture being nearly one-half as long as the ell. A faint umbilical chink is perceptible in a greatly enlarged mera-drawing. The largest specimen is 4.5mm. in length and 2.3mm. width. If, on comparison, the specimens should be found to differ ım the form described by Mr. Smith, they may be called *Eatoniella lata.*

The operculum of this species, besides being subspiral instead of con-ıtric, differs from that of *Rissoella* Gray (=*Jeffreysia*, Alder) in having ɜ process extended at a much more obtuse angle, but on the same le of the operculum.

EATONIELLA CALIGINOSA.

tonia caliginosa, E. A. Smith, l. c. 71.

ıs. No. 11899.

Two specimens, apparently of this species, were obtained by Dr. Kid-r.

MURICIDÆ.

PURPURA STRIATA.

ccinum striatum, Martyn, Un. Conch.

ıs. No. 11900.

New Zealand, Martyn; Kerguelen, Dr. Kidder, two specimens, one ring; probably this species, which is common in New Zealand.

PATELLIDÆ.

PATINELLA MAGELLANICA.

tinella magellanica, Dall, Am. Jour. Conch. vi, 273, 1871.
tella magellanica, Gmelin.
tella deaurata, Auct.
tella ferruginea, Wood, Index Test. No. 22.
tella fusca, Dillwyn, Cat. ii, 1047, No. 70.

ım. No. 11901.

Magellan, United States Exploring Expedition; Kerguelen, seven specimens, much worn, Dr. Kidder.

PATELLA? DELESSERTII, Philippi.

Mus. No. 11902.

Straits of Magellan, authors; Kerguelen, one dead specimen probably of this species, Dr. Kidder.

CHITONIDÆ.

GENUS HEMIARTHRUM, Cpr., MS.

Valvæ terminales laminatæ, haud articulatæ, laminæ laterales obsoletæ; zona lanuginosa, porifera; branchiæ posticæ.

HEMIARTHRUM SETULOSUM, Cpr., n. s.

Mus. No. 11903.

H. t. latiore, curvata, olivaceo-fusca; jugo planato; mucrone subcentrali? areis haud definitis; totâ superficie sensim quincunxiter granulosâ, granis satis extantibus.

Intus; valva anticâ et posticâ conspicue laminata; laminis acutis, haud incisis, haud regularibus, valde extantibus; subgrundis spongiosis, minimis; valvis centralibus et posticâ laminis suturalibus, triangularibus, maxime distantibus, extantibus, decliviter lateraliter, continuis; sinu maximo, valde spongioso.

Zona modicâ, haud expansâ, solida, leve; sparsim minutissime lanuginatâ; poris minutissimis, setuliferis ad suturas, et circ. iv, circum valvas terminales sitis, instructâ, setulis minimis, curtissimis.

Animal, pede capiteque normalibus; branchiis majoribus posticis, utroque latere circiter vi, medio pede tenus. *Lon.* 13^{mm}. *Lat.* 7^{mm}. *Div.* variante ad 130°.

Kerguelen Island, on stones at low water, Dr. Kidder, two specimens.

This shell, externally, resembles some of the coarse, ill-defined acanthochitons. The girdle, however, is narrower and smoother than in that genus, and the pores so extremely minute that in a dry specimen they would escape attention. Within, however, the features are entirely new, though not unexpected. It forms a transition between *Hanleia* (*mendicaria*) and the articulate chitons. A single unslit lamina surrounds both the terminal valves, projecting far beyond the external layer. In the posterior plate this is continued forward to form part of the sutural laminæ. These, in all the valves, slope off, both toward the middle and toward the sides, so as to take the place of the ordinary side-laminæ, which here do not exist.

The specimen examined—hardened by preservation in alcohol and

softened in water only—had the plates so much affected by the decortication of the whole jugular portion that I was unable to extract them in a perfect condition. However, all the characters could be made out except the *mucro*, which, judging by the remaining striæ of growth, must have been central, or nearly so. (Carpenter MS.)

HELICIDÆ.

HELIX (HYALINA) HOOKERI.

Helix hookeri, Pfr. Mon. Hel. iii, 88, No. 531.
Helix hookeri, Reeve, Conch. Icon. 208, n. 1474.

Mus. No. 11904.

Kerguelen Island, Hooker, Dr. Kidder. Gregarious about and under stones. Occasionally the shell of this species appears to be partly membranous, and in drying, from this cause, the spire is frequently abnormally flattened.

SIPHONARIIDÆ.

SIPHONARIA TRISTENSIS.

Siphonaria tristensis, Sby. Gen. Sh. f. 3.; Dall. Am. Journ. Conch. vi, 1870.
Siphonaria lessoni, Blainv. *teste* Rve. Ic. v., fig. 23, a, 6.

Mus. No. 11905.

Tristan d'Acunha, Rve. Orange Harbor, Patagonia, United States Exploring Expedition; Kerguelen, Dr. Kidder; abundant between tidemarks.

ACEPHALA.

LASEIDÆ.

LASEA RUBRA, Mont.

Mus. No. 11906.

Kerguelen Island, Dr. Kidder, four specimens; with mussels. Distribution world-wide. These individuals are rather larger than most northern specimens.

LEPTONIDÆ.

LEPTON PARASITICUM, n. s.

Mus. No. 11907.

Shell small, elongate ovate, inflated, thin; beaks nearly central, not prominent, surface shining, but not polished, with the texture of a *Pandora*. Shell white, hardly sculptured, but under a high magnifying

power showing delicate concentric lines and fine radiating, apparently pubescent, lines extending from the umbones. Margins of the shell covered by an extension of the mantle, provided on each side with seven or eight stout cirri or tentacular processes. A single larger cirrus above the foot at the anterior end. Siphon short, foot small, very close to the anterior end of the shell.

Length, 2 mm; height, 1.6 mm.

Habitat, in the channels leading to the oral aperture of a species of echinoid (*Tripylus*), where it appears to lead a parasitic or at least a commensal existence. These echini were dredged by Dr. Kidder at Royal Sound, Kerguelen Island, near the station of the United States observers, in five and twelve fathoms. These tiny mollusks were quite abundant on the particular portion of the echinus mentioned, but none were found on any other part. It would seem as if the soft parts, before becoming contracted by the alcohol, must have almost entirely enveloped the shell. The latter was of such extreme tenuity that all efforts to remove it entire from the specimens resulted in its destruction. The teeth appeared, however, to resemble those of the other species of the genus; none of which, so far as I can recall, have been reported as commensal animals.

MODIOLARCIDÆ.

KIDDERIA, n. g.

Shell minute, byssiferous, concentrically sculptured, with two minute cardinal teeth in each valve, and a partially internal ligament attached to a more or less prominent process on the inner hinge-margin of each valve. Pallial line simple.

KIDDERIA MINUTA, n. s.

Mus. No. 11908.

Shell minute, thin, inflated; shaped not unlike a short *Lithodomus*; the upper posterior surface dark rose-color, the basal and umbonal portions of the valves whitish, with an excessively thin epidermis; the interior more or less suffused with rose-color, smooth, but not polished. Muscular scars indistinct, anterior scar rounded, posterior ovate. Umbones rounded, inflated, nearly terminal; anterior end of shell subtruncate, posterior end rounded. Surface smooth, under a high power showing minute rounded incremental concentric ridges. Cardinal teeth very minute, anterior largest, hinge-margin not thickened except at the ligamentary processes. Ligament strong and thick, attached almost exclu-

sively to the inner side of the hinge-margin, but partly visible from the outside between the edges of the valves.

Length of largest specimen, 4^{mm}; height, 3^{mm}; diameter, 2.5^{mm}.

This minute shell was found attached to the byssus of *Mytilus canaliculus*, and at first sight might be readily taken for the fry of that species. An examination of the hinge and muscular scars, however, is sufficient to dispel this impression.

It differs from *Modiolarca*, in its single anterior muscular scar, the presence of strong *nymphæ* for the subinternal ligament, and in the full development of the cardinal teeth; which, though minute, stand sharply out from under the cardinal border, instead of being subobsolete upon its internal face. The ligament falls little short of being entirely internal. So strong, and so strongly attached is it, that all attempts to clear it from the hinge-processes were ineffectual, and their exact shape (which appears to differ slightly in different individuals) could not be made out. In fact, in opening the shell, the valves would usually give way before the ligament. Its attachments appear to be entirely internal, though the edges of the valves do not quite close over its outer surface. The margin of the shell appears perfectly plain, and most of the specimens possess a slender byssus.

Modiolarca pusilla, Gould, appears (from the type specimens) to belong to this group, but it differs from *K. minuta* in form, color, and larger proportional size of the teeth. Gould's figure does not well represent his typical specimens. They were from Tierra del Fuégo, and among some *minutiæ* from Orange Harbor, collected by the United States Exploring Expedition, I found several specimens of *K. minuta*. In some respects this shell recalls *Ceropsis* of the *Carditidæ*.

I am pleased to be able to connect with this interesting little form the name of Dr. Kidder, who has, with very limited opportunities and the disadvantage of a comparatively short stay on the island, succeeded in accumulating a most interesting fund of specimens and biographical notes.

MYTILIDÆ.

MYTILUS MAGELLANICUS, Chemn.

Mus. No. 11909.

New Zealand, Straits of Magellan, authors; Kerguelen Island, Dr. Kidder; four living specimens, much eroded, and numerous dead valves.

MYTILUS CANALICULUS, Hanley.

Mytilus latus, auct. non. Lam.
Mytilus ungulatus, Rve. Conch. Ic. ii, 4.

Mus. No. 11910.

Chili, Reeve; New Zealand, Hanley; Kerguelen Island, Dr. Kidder, living; abundant. The shell of this species closely resembles some varieties of *Mytilus edulis*, but the soft parts are quite different. The foot is large and quite flat beneath. The viscera and branchiæ are white; the foot and mantle edge streaked with dark brown.

The following species, not obtained by Dr. Kidder, but described as new, by Mr. Smith, in the paper referred to; and other previously-described species, which are not enumerated in the paper in the Annals, were found by the Rev. A. E. Eaton, of the English party at Kerguelen.

Struthiolaria mirabilis, Smith.
Buccinopsis (?) eatoni, Smith.
Trophon albolabratus, Smith.
Littorina setosa, Smith.
Rissoa Kergueleni, Smith.
Eatoniella subrufescens, Smith, sp.
Skenea subcanaliculata, Smith.
Scissurella supraplicata, Smith.
Solenella gigantea, Smith.
Yoldia subæquilateralis, Smith.

[In addition to the foregoing, the collection contains individuals of an undetermined *Doris*, found in tide-pools, at low-water.—J. H. K.]

MOLLUSCOIDA.

The class TUNICATA is numerously represented, both solitary and compound ascidians being abundant upon rocky beaches and attached to the great masses of kelp (*Macrocystis*) which fringe the shores of the island. A large solitary ascidian, of dark mahogany color, with tough, leathery envelope, was especially common just below low-water mark. Specimens were found as long as 5 inches.

Flustra and numerous other forms of POLYZOA grow luxuriantly upon the stems and leaves of sea-weed, presenting often remarkably

delicate and beautifully branching forms. No brachiopods were collected, owing, I suppose, to the want of facilities for dredging, since better-known regions in the same latitude have been found to be particularly rich in animals of this class. None of the *Molluscoida* have yet been identified specifically.

INSECTS.

COLEOPTERA.

Several species of curculio, and a very few specimens of a small black beetle, were found at different times and in very diverse localities. The little black beetles were caught on rocks near the sea and about the roots of wet tufts of moss. They belong to the genus *Octhebius*, Leach, a member of the aquatic family *Helophoridæ*, McLeay, and are vegetable feeders in the perfect state. The British species are described as slow in their movements, creeping along the stems of aquatic plants, and often crawling out of the water upon the margins of fresh-water pools. There was no body of fresh water near the habitat of these Kerguelen specimens, but the herbage in which they were found is constantly drenched with rain and snow water. Westwood states (Guide to the Classification of Insects, London, 1839) that "this family appears to be confined to temperate climates, no species having been hitherto found as inhabitants of tropical countries, or, indeed, as belonging to the southern hemisphere."

A small black species of curculio was captured near the top of Mount Crozier, above the snow-line, early in the summer (November). It had just crawled out of a tuft of moss upon the surface of a rock. Other similar specimens had been found still earlier in the season under stones in gravelly soil, apparently torpid. Later, many different forms, some of moderate size, were found on the sunny faces of rocks near the sea. Many of these were colored green, blue, or brown, but the colors were generally dull. Most of the species were incapable of flight, their wing-cases being soldered together. Some of the largest forms were good fliers, however, the largest and most brilliantly colored specimen taken having flown into my hut one night, attracted by the light. These curculios were not observed to counterfeit death when approached, as is the habit of the family elsewhere. All of these various forms are pronounced by Professor Gerstaecker (to whom both these and the preceding were sent for identification) to belong to the genus *Phillobius*,

Schönherr, the specimens being too much injured in transportation to admit of the determination of the species. The few drops of carbolic acid, added to the bottle of glycerine, alcohol, and water, in which they were preserved, seem to have been destructive to the more minute parts.

Besides the foregoing, a single specimen of a small brown beetle, supposed to be an elater, was captured and preserved, but has somehow been lost in transportation. Mr. Eaton speaks of finding longicorn beetles, and "several species of *Brachyelytra*." (Ann. and Mag. Nat. History, Oct., 1875, p. 291.)*

It is somewhat remarkable that the prominent form in the *Coleoptera* of Kerguelen, an island destitute of trees and shrubs, should be the curculio, and that the only other form collected by our party should be a water-beetle, living at a distance from any pond or pool. The possibility of importation by the whalers, which have so long frequented the island, should be borne in mind in this connection.

LEPIDOPTERA.

The small vial containing the collection of *Lepidoptera* has been lost in transportation. A single flying tineid moth was observed soon after our landing, but supposed to be a clothes-moth from our own boxes. While preparing some botanical specimens for the press on the evening of December 18, I captured two lepidopterous insects of moderate size, with very imperfect and abbreviated wings, active in their movements, and "seeming to be provided with two pairs of antennæ, one being long and thread-like, the other shorter, pectinate, and curling backward over the top of the head." These insects are noted in my diary as "*Podura-*

* The following species from Mr. Eaton's collection have been described by Mr. Chas. O. Waterhouse, in the Entomologists' Monthly Magazine (London, Aug., 1875, 54), as from Kerguelen's Land:

SUB-ORDER BRACHYELYTRA:

FAMILY, ALEOCHARIDÆ:

Phytosus atriceps, sp. nov.

SUB-ORDER RHYNCHOPHORA:

FAMILY, BRACHYDERIDINÆ:

Canonopsis sericeus, gen. et sp. nov.

Agonelytra, gen. nov.

Agonelytra angusticollis, sp. nov.

Agonelytra gracilipes, sp. nov.

Agonelytra brevis, sp. nov.

like moths of large size, with partly-developed wings, from the roots of plants.[7] Small *Podurœ* were not uncommon. With these exceptions, no members of this order were observed during our stay, although often sought for, particularly at night.*

DIPTERA.

Fam. ACALYPTERA.

(IDENTIFIED BY C. R. OSTEN SACKEN.)

Calycopteryx mosleyi, Eaton, g. and sp. nov.;
Anatalanta aptera, Eaton, g. and sp. nov.;
Amalopteryx maritima, Eaton, g. and sp. nov.—Entom. Mag., Aug., 1875.

Early in November, the first species named above was found on the leaves of the Kerguelen cabbage (*Pringlea antiscorbutica*), and thereafter in increasing numbers. The insects are of considerable size, dark brown in color, with long legs, and considerable activity of movement, looking not unlike large ants. This species is distinguished on superficial examination by its long ovipositor, and by the prominent pubescence covering its abdomen. Upon the approach of the observer the insects drop from the leaves in great numbers, doubling up their legs and counterfeiting death. As the axils of these large leaves always contain a considerable quantity of water, the utility of the pubescence with which the insects are covered becomes very apparent, protecting them from getting wet by the film of air entangled in the hairs. Footless larvæ, supposed to belong to these insects, were found in abundance among the damp roots of moss and grass.

On the 27th of November, I set a jar with its rim even with the surface of the earth and baited it with carrion in the hope of catching beetles. It contained, in the morning, large numbers of *Diptera* of the second species (*Anatalanta aptera*), differing superficially from the preceding by their lesser size, darker color, less pubescence, and much less distinct ovipositors. They were also much more active in their movements, and almost always found upon dead animal matter. They were not observed to counterfeit death on being approached.

It was not until late in December that the third species was discovered on wet rocks at the edge of the sea. These are smaller than either of the others, quite black, not visibly pubescent, and provided

* Mr. Eaton describes only the tineid moth, viz: *Embryonopsis halticella*, gen. et sp. nov. Ent. Mag., *loc. cit.*

with small, triangular rudiments of wings. They cannot fly, but seem to use the wings in jumping, which they do with great activity, making it quite difficult to catch them. They do not appear to jump in any definite direction, but spring into the air, buzzing the small winglets with great activity, and seem to trust to chance for a spot on which to alight, tumbling over and over in the air. I never observed them jumping when undisturbed.

These three genera of wingless flies present several anomalies not heretofore observed. With the structure of flies, they possess many of the habits of beetles, such as that of counterfeiting death when in danger, and seem to represent this order in the economy of the locality. The carrion-feeder (*Anatalanta aptera*) has no vestige of either wings or balancers (halteres), "*Aptera anhalterata*," Mr. Eaton calls them. The leaf-feeders show small scale-like bodies, which Mr. Eaton supposed to represent the balancers ("halteribus brevibus et parvis"). Baron Osten Sacken, however, finds that these scales are really representatives of the wings. The third genus (*Amalopteryx maritima*) represents a further step in the progress of development, possessing both wings and balancers, but still unable to fly. A small gnat, observed only during the time of flowering of the "Kerguelen tea" (*Acæna affinis*, Hook. fil.), was the only flying insect observed by me while on the island. Even the common house-fly had not yet been naturalized. Mr. Eaton mentions also a species of *Tipulidæ*,* with imperfect or abortive wings.

PSEUDO-NEUROPTERA.

By H. A. Hagen.

Rhyopsocus eclipticus.

Head large, triangular, scarcely longer than broad, flattened above; occipital margin straight, very little notched in the middle. Eyes black, scarcely prominent, placed in the hind angle of the head; half as long as the head, half as broad as long, slightly rounded externally, with very large facets, only 15 along the external margin; ocelli wanting (Note 1). Nasus large, tumid, nearly straight before, the angles rounded; labrum half as long as broad, front margin straight, angles rounded; antennæ inserted between the base of the clypeus and the eyes, long, nearly as long as the body, thin, 26-jointed; the two basal joints much larger, of equal length, cylindrical; the six following ones nearly equal, cylindrical, a little shorter than the second one; the eight following ones a little shorter, somewhat ovoid; the last of them (the 16th)

* Described as *Halyritus amphibius*, Eaton, Entom. Mag., Aug., 1875.

little shorter and more dilated; the following ten cylindrical, a little longer, except the shorter terminal one. Fine hairs are inserted around the joints, sometimes two on each side, sometimes more—up to four or six. In the basal part of the antennæ the hairs are longer (Note 2). Mouth-parts strong; mandibulæ hooked, the base interiorily dilated and denticulated; maxillæ with an elongated interior lobe, with two series of teeth at the base; the long horny stem straight, bifid on tip, exterior branch a little longer; maxillar palpus 4-jointed, large, last joint longer, hatchet-shaped, with numerous hairs in small holes on the apical margin; labium with two triangular inner lobes, and 2-jointed palpæ, the first very short, the last large, similar to the last joint of the maxillary ones, but smaller. Prothorax more than half as broad as the head; the hind angles protracted into triangular lobes. Mesothorax and metathorax not very distinct, seemingly as broad as the prothorax, side lobes more rounded.

Fore wings shorter than the abdomen, three times longer than broad, rounded on tips, anterior margins in a very flat curve, posterior nearly straight; base of the wing a little narrower than the tip, rounded posteriorly. The whole margin around the wing is bordered by a strong vein, thickly beset with oblique darker stripes or tubercles; and at larger intervals with longer stiff hairs, set in holes, mostly on the veins, some near by in the membranous part of the wings. One middle vein is soon furcated beyond the base into a superior and an inferior branch. The superior branch provides the anterior half of the wing; it is furcated very soon again, the two branches running parallel and uniting at about the middle of the length of the wing by an oblique vein. From the upper end of this oblique vein goes a short branch straight to the anterior margin of the wing, and two longer ones to its rounded apex, the inferior of them again furcated at about its middle; from the inferior end of the oblique vein goes one branch, furcated half-way to the inferior part of the wing-apex; the inferior branch of the two last ones is, in the other wing, furcated again a short distance from the margin. The inferior branch of the furcation just beyond the base of the wing is again furcated just before the middle of the wing, and its superior branch again; so it goes, somewhat incurved, with three veins, to the apical half of the hinder margin. There go one (or two) straight veins from the basis in an oblique line to the basal half of the posterior margin. I am not sure whether a short oblique vein goes from the basis to the anterior margin. The right wing is more irregular, and it seems that

the inferior branch, distributed to the apical half of the hinder margin, comes from the superior one, somewhat in front of the oblique vein, and that its two inferior branches are derived, as in the other wing, from the basis. All veins are beset at intervals with stiff hairs, like the marginal vein.

The hind wings are similar in shape to the fore wings, but shorter and narrower. The surrounding marginal vein similar but not so strong. There are none of the long hairs in the hind wing. A middle vein gives off in the first third an oblique branch to the hind margin. This is the only vein in the hind wings reaching the marginal vein. All others cease more or less abruptly before reaching them. Shortly after a similar oblique vein goes to the anterior margin. In the middle of the length of the wing the main vein is branched, and gives a long inferior branch going to the hind margin near the tip without reaching it; then, the superior branch furcates in two parallel branches going to the tip; the inferior one shows posteriorly an indication of the beginning of a branch.

Legs long, stout, the posterior longer than the abdomen; femurs stout and thick (perhaps the species jumps like many *Psocidæ*); tibia cylindrical, as long as the femur, slightly hairy, with two movable spines on the apex below; tarsi 3-jointed, one-third shorter than the tibia, cylindrical, the last joint long, the two others equal, and together two-thirds of the length of the basal joint; at the apex of the last joint two claws, thicker at their bases, the apex fine, a little bent at tip; between the claws a rounded plantula.

Abdomen ovoid, more pointed toward the apex. The egg-valves very clearly visible (the specimen is a female); two exterior membranous, elongated lobes, two horny interior stems, long, narrow, perhaps articulated; the apical part bent inward, and the tip again outward; between the two horny ones are two smaller elongated, pointed, horner stems, much shorter than the others.

The color is pale brownish-yellow, darker on head and mandibles; antennæ grayish; wings hyaline, colorless, the long hairs of the fore-wings dark.

Length of the body a little less than 2 millimeters; expanse of fore wing 1½ millimeters. Locality Kerguelen Island, October, 1874.*

* The only specimen noticed during the stay of the Transit Party at Kerguelen was captured October 17, within doors, and was mounted in balsam upon a microscopic slide. Shortly before its capture some instrument-boxes, brought from Washington and containing a quantity of packing-straw, had been unpacked in the same room; a circumstance rendering the habitat of the insect very doubtful at the time.—J. H. K.

The specimen belongs, doubtless, to the so-called micropterous forms of *Psocidæ*, which occur occasionally and are observed in many species. Mr. Westwood has founded upon such specimens the genus *Lachesis* proved by M'Lachlan to be, probably, a micropterous condition of *Cœcilius pedicularius*. In the Kerguelen specimen the shortness of the wings (the fore wings are shorter than the body), and the reticulation not identical in both wings, show an aborted condition. The systematic place is rather doubtful.

Within the section of *Psocidæ* with ocelli (I have stated that I believe the Kerguelen specimen to be *without* ocelli) two genera have legs with 3-jointed tarsi. But in both (*Myopsocus and Elipsocus*) the second joint is much shorter than the third, and the antennæ only 13-jointed. Of the species described for those genera *E. pumilis* from New York is not very much larger, and is similar in colors. But the reticulation is very different and ocelli are present. In my two specimens the antennæ and tarsi are broken.

Among the *Psocidæ* without ocelli only *Psoquilla* could be taken into account. The tarsi are of the same shape, the palpi also; the antennæ are equally multiarticulate, but *Psoquilla* possesses no hind wings, and the reticulation is scarcely related. I should add that *Psoquilla* is known only by three specimens of uncertain locality, and not in good condition.

The genus *Psyllipsocus*, founded by Baron De Selys Longchamps on *Psocus pedicularius Rambur*, approaches this species more nearly in regard to the reticulation of the fore-wings, and has 3-jointed tarsi, but nothing is stated about their length, or about the presence of ocelli, or the number of joints of the antennæ. The single specimen, in bad condition, is perhaps also exotic, that is, imported into Paris with plants or merchandise.

Therefore the specimen, not agreeing with any known species or genus, must belong to a new genus, which I name *Rhyopsocus*. The character of the genus would be sufficiently established; *ocellis nullis; antennis 26-articulatis palpis maxillaribus articulo apicali magno, truncato; tarsis triarticulatis, articulis duobus apicalibus æqualibus; alis quatuor.*

The question whether the species is introduced from America, is not to be answered with certainty. All species hitherto known from America differ from one another. The only species I have not seen is *P. pusillus* Harris, but the description differs. Now it is certain that not more than ten per cent. of the species living in North America are known, probably even less.

The introduction of the Psocidæ into foreign countries is very easy. Two species, living in Ceylon upon the coffee-tree, have been collected near Rio de Janeiro by Mr. B. P. Mann, on the coffee-trees introduced long ago from Ceylon. Perhaps they are also introduced in Ceylon. *Atropos oleagina* occurred in Ceylon, and was stated to have been imported with oil-cake from England; but there is no evidence that the species is British. Other species of *Atropos* and *Psocus* occur in many parts of the world. The curious instance that R. eclipticus has aborted wings, like most of the Kerguelen insects, would in this case not be a certain proof for the habitat. But it is certainly not impossible.

NOTES.

NOTE 1.—As the presence or the absence of the ocelli is a very important character, I have spent a considerable time in examining those organs. I confess that there are still some doubts about this matter. In the middle of the head, and in the same direction with the upper ends of the eyes, is a transverse air-bubble, or better, a hole filled with air, assuming the shape of the cerebrum, narrower toward the middle from behind, rounded at the end. But the two sides differ in shape. The left side is cylindrical, rounded at the outer end, with a cup like a watch-glass, imitating well the cornea of an ocellum; the right side has a similar shape, but the outer end is in some way extravasated, beginning from the place where on the left side the cornea-like cup begins. The place filled with the extravasation is represented on the left side by a hollow space, to be seen well marked in the interior of the head. A third anterior ocellus is entirely wanting, although the parts are all quite visible, and I see two little prominences which would represent the beginning of the two nervous commissures encircling the œsophagus. Though the whole interior of the body is transparent, and the digestive organs are quite visible, I cannot distinguish anything belonging to the nervous system, not even the ganglia; probably they are too transparent. After all, I consider the above transparent, transversal organ to be the cerebrum, and the ocelli as wanting, the more so since the Psocidæ known have either three ocelli or none, but never two. And even here, if the two posterior ocelli only were represented, they are much more separated from each other than in any species hitherto known.*

NOTE 2.—The antennæ were broken; on one side only eight joints remained, on the other, twelve; but lying near by was the apical part of

* So large a number of joints in the antennæ is only to be found in species without ocelli.

irteen joints. The joints are covered with numerous fine pores; but mmonly one much larger pore on each side, below the middle, is very nspicuous in the middle joints of the antennæ, principally in the six- nth and preceding joints. Such a large pore contains the insertion a sensitive hair.

No other order of insect proper seems to be represented on Kerguelen and than those already mentioned. Neither was any member of the ss *Myriapoda* observed. Spiders of the wandering sort are abun- nt, their tents being numerous under almost every large stone. There no web-builders, however, and, although individuals are numerous, variety in form is slight. The collection has been sent to Mr. Will- n Holden, of Marietta, Ohio, for identification.

A small red acarinus was very plentiful upon the leaf-stalks of the rguelen cabbage, and, indeed, wherever succulent vegetation was lux- ant. Broad yellow bands, observed on the sides of rocks frequented cormorants, were found to consist almost entirely of another variety acarinus, yellow in color, and spotted on the back, somewhat like the ady-bird" (*Coccinella*).

CRUSTACEANS.

DESCRIBED BY S. I. SMITH.

DECAPODA.

PINNOTHERIDÆ.

HALICARCINUS PLANATUS, White.

ncer planatus, J. C. Fabricius, Entomologia Systematica, ii, 446, 1793.

ucosia planata, J. C. Fabricius, Supplementum Entomologiæ Systematicæ, 350, 1798.

menoroma tridentatum, Lucas, in Hombron et Jacquinot, Voyage de l'Astrolabe au pôle sud, 60, pl. 5, figs. 27–33.

licarcinus planatus, White, Annals and Magazine Nat. Hist., vol. xvii, 178, 1846, pl. 2, fig. 1; Catalogue Crust. British Museum, 33, 1847.—Dana, United States Exploring Expedition, Crust., 385, pl. 24, fig. 7, 1852.—Edwards, Annales des Sciences naturelles, 3me série, xx, 1853, 223.—Heller, Reise der österreichischen Fregatte Novara um die Erde, Crust., 66, 1865.

Specimens of this species were collected at Kerguelen Island, on ocky beaches, and others were dredged in five fathoms. It was previ- usly known from Tierra del Fuego and New Zealand. The males are early equal in size to the females, and have very much stouter cheli-

AMPHIPODA.

ORCHESTIDÆ.

HYALE VILLOSA, Smith, s. n.

Of this species there is in the collection only a single somewhat mutilated specimen, from which the following description is taken :

Male : Second and third segments of the peduncle of the antennula subequal in length, very slightly shorter than the first ; flagellum imperfect. Ultimate segment of the peduncle of the antenna longer than the penultimate, and almost as long as the last two segments of the peduncle of the antennula ; flagellum nearly twice as long as the peduncle, and composed of about seventeen segments ; the last segments of the peduncle and the proximal portion of the flagellum quite thickly villose.

First pair of gnathopods with the carpus short and triangular ; the propodus not quite twice as long as broad, of the same breadth at each end, the palmary margin slightly oblique and a little convex in outline, armed with a slender spine on the inside at the rounded posterior angle, and clothed with a few hair-like setæ, as is also the distal portion of the posterior margin ; the dactylus long and strongly curved, so as to reach round upon the posterior margin. Second pair of gnathopods with the propodus caudate in outline, about five-sevenths as broad as long, and narrowed rapidly distally ; the palmary and posterior margins forming a continuous curve of nearly the same convexity as the anterior margin, densely villose throughout, and armed on the inside, at the tip of the closed dactylus, with a single stout spine ; dactylus about half as long as the propodus, stout and strongly curved. Posterior pair of pereopods only slightly longer than the fourth pair, which are considerably longer than the third pair ; the bases of these three pairs, with the posterior margins expanded, evenly arcuate and unarmed. Infero-posterior angles of the second and third segments of the pleon right-angled but not produced. Uropods all short ; the bases of the first and second pairs reaching to the same point, and the inner rami in both slightly longer than the outer ; third pair about as long as the bases of the second, and with the ramus about as long as the base.

Length, excluding antennæ, nearly 10^{mm}.

Rocky beaches, Kerguelen Island.

This species is evidently very closely allied to *Hyale hirtipalma* (*Aller-*

tes hirtipalma, Dana, Crustacea United States Exploring Expedition, 88, pl. 60, fig. 4, 1852) from the coast of Peru. According to the ription and figures, however, the propodus in the first pair of thopods in that species is much narrowed proximally, the propodus he second pair is twice as long as broad, the palmary margin is htly emarginated in the middle, and there is no mention made of spine. The maxillæ and maxillipeds agree well with the figures of se appendages given by Dana.

LYSIANASSIDÆ.

Lysianassa kidderi, Smith, s. n.

yes of moderate size, oval and black. Antero-lateral margin of the d produced, nearly right-angled, with the angle very slightly rounded. al segment of the peduncle of the antennula stout and about as long he head; second and third segments very short; flagellum scarcely ger than the peduncle; secondary flagellum about half as long. enna in the female scarcely longer than the antennula; all the seg- nts of the peduncle very short; the flagellum tapering rapidly, and posed of only seven or eight segments. In the young males the enna is much longer than the antennula, and the flagellum is com- ed of twelve to fifteen segments, and furnished along the upper side h vase-shaped sensory organs.

First pair of gnathopods, not subcheliform, short; carpus much stouter n the propodus and nearly as long; propodus tapering distally to rcely more than the breadth of the dactylus, which is stout, and not re than a third as long as the propodus. Second gnathopods slender; rpus fully a third as broad as long, slightly narrowed distally; pro- dus almost as wide but not as long as the carpus; the extremity ncated, with the posterior angle produced into a small tooth opposed the minute hooked dactylus, which arises at its base and below the ddle of the terminal margin; the posterior edge is armed with short d acute spines, while the anterior edge and the sides are clothed with ender setæ, and the terminal margin, above the base of the dactylus, ith longer and stouter setæ, curved at the tips. Coxæ of the third air of pereopods broader than long. Posterior edges of the bases of he third to the fifth pair evenly curved, with only very slight emargina- ions at the insertions of the very minute and widely-separated marginal airs; the meral segments of the same appendages broad, and their

postero-inferior angles strongly produced. Infero-posterior angles of the second and third segments of the pleon obtusely rounded and not produced. Uropods all short; the posterior pair especially so; the base as thick as long; the outer ramus slender and shorter than the base; the inner minute, not more than half as long as the outer. Telson as broad as long, narrowed toward the extremity, which is truncated and slightly excavated.

Length, excluding antennæ, 3^{mm}. to 4^{mm}.

Rocky beaches, with the last species.

All the specimens received are apparently immature, and the males evidently, and very likely the females also, have not attained the adult characters. The species does not agree fully with the characters assigned by Boeck to the genus *Lysianassa* as restricted by him, and I therefore subjoin a description of the appendages of the mouth.

The mandibles are slender, with the molar area half-way from the tip to the attachment of the long and slender palpus which arises near the base. The inner lobe of the first maxilla is large, reaches more than two-thirds of the way to the tip of the outer lobe, and is furnished with two very minute setæ at the tip and numerous fine hairs along the inner margin; the palpus is very slender and tapers to a point, near which it is armed with a very few slender spines. The inner lobe of the second maxilla is broad and nearly or quite as long as the outer lobe. The inner lobe of the maxillipeds is elongated, armed at the tip with three obtuse teeth, and reaches to the distal extremity of the second segment of the palpus; the outer lobe is very large, unarmed, and reaches beyond the middle of the third segment of the palpus; the palpus is slender, the ultimate segment styliform and less than half as long as the penultimate.

The antennulæ, mandibles, second maxillæ, maxillipeds, and posterior uropods are more like some of the species of *Orchomene* than they are like the species of *Lysianassa*, as described and figured by Boeck, and the characters assigned to *Lysianassa* by this author would require considerable modification to admit our species.

Lysianassa kergueleni, Miers (Annals and Magazine Nat. Hist., iv, vol. xvi, p. 74, 1875), collected at Kerguelen by the Rev. A. E. Eaton, judging from the very short description, is quite a different species and not a *Lysianassa*, even in the unrestricted sense in which that generic term is used by Kroyer and Bate, for the first pair of gnathopods are said to be "subchelate."

GAMMARIDÆ.

ATYLUS (?) AUSTRALIS, Miers (?)

? *Paramæra australis*, Miers, Annals and Magazine Nat. Hist. iv, vol. xiv, 75, July, 1875.
? *Atylus australis*, Miers, loc. cit., 117, Aug., 1875.

There are, in Dr. Kidder's collection, a considerable number of specimens of an *Atylus*-like amphipod which I very hesitatingly refer to this species described by Miers from specimens collected at Kerguelen Island by the Rev. A. E. Eaton. Dr. Kidder's specimens differ in several points from the very brief description given by Miers. The most important of these differences is the existence of minute secondary flagella upon the antennulæ of our specimens, while Miers's species is said to have "exappendiculate" antennulæ. Although the secondary flagellum has usually been said to be wanting in all the *Atylinæ*, it exists, according to Bate, in the young of the typical *Atylus carinatus*, Leach, and it has very likely been overlooked in the adults of some of the species of the group. Its minute size might have caused it to be overlooked by Miers in the present case. This species cannot be referred to the genus *Atylus* as restricted by Boeck, but, on account of the doubt in regard to the identity of our specimens with the species described by Miers, and the doubt whether *Paramæra* should be retained for Miers's species if a distinct genus, I content myself on the present occasion with the following description of the species in my possession:

The eyes are very large, oval, and black. The anterior margin of the head projects in a slight obtuse angle, between the bases of the antennulæ. The antennulæ are furnished with a minute secondary flagellum of a single segment, considerably shorter than the diameter of the first segment of the primary flagellum, but tipped with two slender setæ several times as long as the segment itself.

The gnathopods of the male are subequal, but those of the second pair are somewhat larger than the first. The carpus in each pair is about half as long as the propodus, and the distal portion of the posterior margin is armed with numerous setæ. The propodus in the first pair is about a third as broad as long; the edges are nearly parallel, but both slightly convex in outline; the posterior margin is furnished with fascicles of short, setiform hairs; the palmary margin is furnished with a narrow lamellar edge, is slightly oblique, evenly convex in outline, and the posterior angle is broadly rounded and continuous with the posterior margin, which, however, is armed, each side, with several stout

spines. The dactylus fits closely to the palmary margin. The propodus in the second pair is in all respects similar, but stouter, being fully half as broad as long; the palmary margin is a little more oblique, not quite as convex in outline, and the spines at the posterior angle are stouter. The dactylus is so much curved that it does not fit closely the middle part of the palmary margin. The gnathopods of the female are similar to those of the male, but much weaker and nearly equal in size, and the setæ of the posterior margins of the carpi and propodi are very much longer. The propodus in each pair is only a little longer than the carpus, about half as broad as long, and slightly narrowed proximally, and the palmary margin is very nearly transverse, with its posterior angle only very slightly rounded.

The inferior margins of the first three segments of the pleon are slightly arcuate and armed on the outside with a submarginal series of short spines, but the edge is not serrate. The posterior margins of the first and second segments are nearly straight and make nearly a right angle, very slightly rounded, with the inferior margins, while the posterior margin of the third segment is arcuate with the inferior angle broadly rounded. The peduncles of the second uropods do not reach to the tips of the peduncles of the first pair, and the outer rami in both these pairs are much more slender and considerably shorter than the inner, which reach nearly or quite to the tips of the third pair. The rami of the posterior uropods are subequal, longer than the peduncles, taper regularly to acute points, and are armed along each margin with stout spines and long setiform hairs, the latter principally upon the outer margins. The telson is about two-thirds as broad as long, narrowed distally, divided two-thirds of the way to the base, and armed with a slender spine at the tip of each lobe, and often with one or two additional spines on each side.

Length of the largest specimens, excluding the antennæ, in the females about 9^{mm}; in the males a little less.

The mouth-appendages agree very well with those of *Atylus carinatus*, as figured by Kroyer (Voyages en Scandinavie, en Laponie, etc., pl. 11, fig. 1), but the mandibular palpus is considerably stouter than represented in the figures referred to, and the second and third segments are very nearly equal in length, the second segment somewhat stouter than the third.

Rocky beaches, Kerguelen Island.

ISOPODA.

ASELLIDÆ.

JÆRA PUBESCENS, Dana.

Jæra pubescens, Dana, United States Exploring Expedition, Crustacea, 744, pl. 49, fig. 9, 1852.

Associated with the following species upon rocky beaches, Kerguelen Island. Dana's specimens were from Nassau Bay, Tierra del Fuego.

SPHÆROMIDÆ.

SPHÆROMA GIGAS, Leach.

Sphæroma gigas, Leach, Dictionnaire des Sciences naturelles, vol. xii, 346 (*teste* Desmarest and Edwards).—Desmarest, Considérations générales sur la classe des Crust., 301, 1825.—Edwards, Histoire naturelle des Crust., vol. iii, 205, 1840.—White, List of Crustaceans in British Museum, 102, 1847.—Dana, United States Exploring Expedition, Crustacea, 775, pl. 52, fig. 1, 1852.

A large series of specimens of all sizes from 5^{mm} to 29^{mm} in length were obtained, all the larger specimens from the gullets of terns, the smaller ones from rocky beaches. All the specimens agree with the typical *gigas*, and do not seem to approach the *S. lanceolata*, White, (Annals and Magazine Nat. Hist., vol. xii, p. 345, 1843, and List of Crustaceans in British Museum, p. 102, 1847).

SEROLIDÆ.

SEROLIS LATIFRONS, White.

Serolis latifrons, White, List of Crust. British Museum, 106, 1847 (no description); Voyage of the Erebus and Terror, Crust., pl. 6, fig. 12.—Miers, Annals and Magazine Nat. Hist. iv, vol. xvi, 74, 1875.

Rocky beach, Kerguelen Island.

Only one specimen was obtained. This is a female, and considerably larger than the British Museum specimen. Our specimen differs somewhat in outline and proportions from White's figure; but the differences are very likely due to sex, although the sex of White's specimen is not stated. The antennæ are smaller than given in White's figure, the peduncle being scarcely longer than the head and the first thoracic segment. The peduncle of the antennula reaches beyond the lateral angle

of the first thoracic segment; the first three segments are scarcely longer than broad, the fourth about as long as the second segment of the antenna, and the fifth about twice as long as the fourth; the third, fourth, and fifth segments are flattened above, with the margins slightly raised, and with a strong median carina.

Length from front of head to tip of pleon, 37^{mm}; length of pleon, 13^{mm}; breadth of first thoracic segment, 24.5^{mm}; greatest breadth at third thoracic segment, 26.5^{mm}; breadth at last thoracic segment, 21.5^{mm}.

ANNELIDS AND ECHINODERMS.

By A. E. Verrill.

ANNELIDA.

Very few species of annelids were collected, and only two species are represented by sufficiently well preserved specimens to warrant full descriptions. One of these is a large terebelloid worm belonging to a genus hitherto seldom met with and but imperfectly known.

Nereis antarctica, Verrill, s. n.

One specimen of a *Nereis*, about two inches long, lacks some of the caudal segments and part of the tentacular cirri, but is otherwise pretty well preserved in glycerine.

The body is moderately stout and tapers from near the head backward. The cephalic lobe is rather narrow, and suddenly more narrowed in front of the eyes, which are large and prominent, those on the same side almost in contact and nearly in the same line; the frontal antennæ are rather long and slender; the upper tentacular cirri are wanting, but the lower ones are rather long and slender, those of the posterior pair reaching back to the sixth body-segment. The buccal segment is narrower but considerably longer than the following ones, and has a median obtuse angle projecting forward over the posterior border of the cephalic lobe. The lateral appendages of the anterior segments are rather stout, with a longer, slender dorsal cirrus. The upper ramus consists of two short, stout, obtusely rounded lobes, which are nearly equal in length and form, the upper one bearing the dorsal cirrus at about the middle of its upper side, on a slight swelling, while a fascicle of slender compound setæ comes out from between them; these setæ project about twice the length of the setigerous lobes, and all have a moderately

g, slender, acute terminal piece. The lower ramus consists of a ller, subacute, lanceolate upper setigerous lobe, which is a little ger than the upper ramus, and of a shorter, broad, stout, rounded er lobe, bearing the small, slender ventral cirrus at its base. The e of the lower ramus form two groups, the uppermost consisting ly of slender, acute setæ, like those of the upper ramus, but longer, partly of somewhat shorter ones with a short, curved, bidentate inal piece. Farther back the form of the appendages changes dually, chiefly by all the lobes becoming more elongated and acute, by the gradual development of a special acute setigerous lobe on upper ramus. Toward the posterior end of the body the upper us becomes more elongated than the lower, with a narrow, elongated er ligula with the elongated and slender dorsal cirrus arising from cided hump on the middle of the upper edge, and extending more half its length beyond the ligula; and the lower lobe is also elon-d, lanceolate, obtuse, with a shorter, acute, setigerous lobe arising its upper side. The lower ramus consists of two lanceolate lobes, upper or setigerous one being about as long as the setigerous lobe of upper ramus, while the lower one is a little shorter. The setæ are nged as on the anterior segments, but those of the upper ramus are longest; the ventral cirrus is very small and hardly one-fourth the gth of the dorsal one.

Kerguelen Island, on the beach; Dr. J. H. Kidder.

differs considerably from any of those known in the North Atlantic, would hardly go into any of the generic divisions proposed by Dr. lmgren.

the same bottle with this species, and probably made by it, there a curious nest, made of tough mucus threads, which inclosed nu-ous small eggs in a long crooked band of many rows. The nest is on side of a flat alga, which is drawn together by the external looser ads, as leaves often are by *Tortrix* larvæ.

NEOTTIS, Malmgren (emended).

ska Hafs-Annulater, in Öfversigt af Kong. Vet. Akad. Forhandlingar, 1865, 388.

his genus was established for the *Terebella triserialis*, Grube,* from ly, by Malmgren, but he states that he had only seen a mufflated cimen, and, owing, doubtless, to this fact, he erroneously gave as one the characters of the genus the existence of fascicles of setæ on all

*Archiv. fur Naturgeschichte, xxi, 118, 1851, tab. iv, fig. 16.

the segments of the body after the third. But Grube states that in his specimens they exist on twenty-nine to thirty-one segments, "fasciculi setarum capillarium utrinque 29 ad 31."

This genus, as thus emended, is characterized by having transverse groups of simple cirriform branchiæ on each side of the second, third, and fourth segments; fascicles of setæ commencing on the second branchiferous segment and extending to about the thirty-second to forty-eighth; uncini, commencing on the third setigerous segment; the tori, changing to prominent papillæ on the last setigerous segments, and as such extending to the posteror end. The cephalic lobe is short, semicircular, bearing on its front edge numerous tentacles, and on the narrow margin behind the tentacles numerous minute, dark, ocelliform specks.

The genus *Streblosoma*, Sars, is closely allied to *Neottis*, if not identical, but in the former ocelli were not noticed.

Thelepus, Leuck., and *Thelepodopsis*, Sars, are both closely related northern genera, the latter differing only in having gills on but two segments, while the former not only differs in the same way, but the fascicles of setæ extend to the posterior end of the body.

NEOTTIS SPECTABILIS, Verrill, s. n.

Body moderately stout, much elongated; the tubercles bearing fascicles of setæ commence on the second branchiferous segment and exist on from thirty-three to forty-four segments, the highest number occurring on a very large specimen; the size of the tubercles and the number and length of the setæ decreasing backward, so that the last tubercles are quite small, with a few inconspicuous setæ. The tori bearing the uncini, beginning on the third setigerous segment, are low and elongated elliptical, extending downward to the ventral shields; farther back they become narrower and more prominent, becoming quite narrow and elevated at about the twenty-fifth setigerous segment, beyond which the same changes increase at the last setigerous segment, and beyond, to the end of the body they become still more prominent and papilliform, exceeding the last of the setigerous tubercles; of the posterior segments there are 30 or more. On the second to the fifth setigerous segments there is a small rounded papilla between the setigerous tubercles and the tori, on each side. The ventral shields are not very distinctly defined in the alcoholic specimens, especially the posterior ones, so that the number cannot be accurately determined, but they are more numerous than usual; the anterior ones are short but transversely broad, with several deep trans-

verse wrinkles. The cephalic lobe is short and apparently broadly truncate in front, the margin being slightly revolute, and bearing on its anterior surface, in a semicircular group, very numerous long canaliculate tentacles, and on its posterior margin there are numerous minute, inconspicuous, blackish ocelli, forming a crowded row or band on each side; these ocelli are much smaller than in *Thelepus cincinnatus* of our coast. The upper lip is broad, somewhat cucullate, and is produced forward; in a front view it forms about two-thirds of a circle. The lower lip is crescent-shaped and less prominent. The branchiæ are slender, cirriform, much curled, and very numerous, forming transversely elongated groups on the second, third, and fourth segments; the most anterior group being considerably the largest, and extending down on the sides below the level of the setigerous tubercles of the succeeding segments; the third cluster of branchiæ is smaller than the second.

Length of alcoholic specimens, 150^{mm} and upward; diameter, 6^{mm} to 8^{mm}; some of the empty tubes indicate still larger specimens.

The tubes are large and crooked, composed of a tough, thin, translucent, parchment-like lining, to which are firmly and closely cemented coarse grains and small pebbles of black volcanic rock, covering the whole surface, except on the upright terminal portion, which is usually coated with fragments of algæ, mixed with sand. The tubes were attached to stones and pebbles.

Kerguelen Island, twelve fathoms, with roots of *Macrocystis pyrifera*; Dr. J. H. Kidder.

An allied species has been described from the Falkland Islands by Dr. W. Baird as *Terebella bilineata*, but he states that it has 36 segments, with fascicles of setæ, which extend to the posterior end; but it is quite probable that his specimen had lost the posterior segments and really belongs to *Neottis*, with which it agrees in the character of the branchiæ.

Spirorbis, species undetermined.

The tubes of a species of *Spirorbis*, having three or four rather slender whorls, either coiled nearly in one plane, or with the part near the aperture turned upward, smooth, or with slight tranverse wrinkles, occurred attached to the tubes of the preceding species, and on algæ.

Without the animal, it is impossible to identify with certainty the s of this genus.

ECHINODERMATA.

HOLOTHURIOIDEA.

PENTACTELLA, g. n.

In general appearance like *Pentacta*, but destitute of calcareous plates around the œsophagus, and having a distinct muscular gizzard. Tentacles ten, arborescent, nearly all equal in the typical species. Suckers in five double rows; the intervening spaces smooth.

PENTACTELLA LÆVIGATA, Verrill, s. n.

Body elongated, fusiform, rounded, with thin integuments. Suckers alternating in two rows in each zone, not crowded, larger and more numerous in the three lower zones than in the two upper. Cloacal orifice with small and inconspicuous papillæ. Tentacles ten, subequal, elongated, much divided arborescently from close to the base. Three very elongated vesicles, much dilated in the middle; slender at tip, where one of them is forked. Œsophagus not surrounded by any calcareous plates, with the first portion for about half an inch cylindrical, minutely papillose externally. This is followed by a distinct rounded gizzard, smooth externally; beyond this the intestine is constricted, but soon expands into the wider part, which is long and convoluted, with two principal folds, so that it is about three times the length of the body. Two arborescently branched respiratory organs, one of them smaller than the other, with its numerous terminal branches among and around the ovaries; the branches of both are elongated and slender; the ultimate ramuli are also elongated and often dilated at the tips. Ovaries in a large cluster; the numerous tubes are simple and more or less moniliform, about half an inch long. The retractor muscles are well developed and extend from the base of the tentacles near to the posterior end. The cloacal cavity is large. The calcareous plates of the skin are few in number, minute, and widely scattered, irregularly rounded, with lobed or crenated edges, and perforated by four to eight or more rounded pores, of which two or four primary ones are largest. The smaller plates are often four-lobed, the lobes rounded and each of them perforated by a rounded pore, with narrow interstices, two of the pores often larger; this is perhaps the primary form, from which, by additions to one or several parts of the border, the somewhat larger and

more irregular plates may have been derived. Color in alcohol, dull yellowish brown; tentacles yellowish white.

Length of body, 80mm; diameter, 24mm; length of tentacles, 8mm.

Kerguelen Island, twelve fathoms, January, 1875 (No. 214); Dr. J. H. Kidder.

ECHINOIDEA.

HEMIASTER CORDATUS, Verrill, s. n.

Two quite distinct forms, which, for reasons given below, I believe to be the males and females of one species, occurred together in about equal numbers. The specimens believed to be females have very deep lateral ambulacral grooves and large genital openings; in nearly every specimen several young ones,* varying in size, were found in the ambulacral grooves, held in place by the convergent spines of the borders, which meet across the grooves and interlock. Two of these specimens, on dissection, proved to be females. Those supposed to be males have much shallower ambulacral grooves and differ somewhat in form.

The form of the body in the female is broadly cordate, depressed, with a decided emargination in front; vertically truncate and slightly emarginate posteriorly; broadest a little in advance of the middle. The lower surface is convex and swollen, especially posteriorly; the sides well rounded; the interambulacral areas are swollen on the upper side; the abactinal area and the anterior ambulacrum are considerably sunken; the latter has two well-defined double rows of pores extending to the mouth. The lateral ambulacra are elliptical, rather broad, obtuse at the outer end, and deeply sunken, the anterior ones broader, but scarcely longer than the posterior ones, but those of the opposite sides are not quite equal in size or form. Ovarial openings large, usually but three, that opposite the right anterior interambulacrum being abortive. Lower border of actinostome rather narrow, prominent, and obtuse. Anal area ovate, the lower border rounded, the upper narrowed, but scarcely acute. Peripetalous fasciole well defined, bending upward but little on the posterior and anterior interambulacal areas, and passing nearly straight across the anterior ambulacrum, but bending upward nearly parallel with the antero-lateral ambulacra, so as to form a decided angle in the front part of the lateral interambulacral areas. Subanal fasciole indistinct or wholly wanting. The tubercles of the upper surface are small, crowded, and pretty uniform in size, ex.

* These young have been sent to Mr. A. Agassiz for examination and description.

cept along the borders of the ambulacral grooves, and especially alon the anterior one, where they are somewhat larger; beneath they a considerably larger, but not crowded, the largest ones in front, the si decreasing toward the sides, and especially posteriorly. The spines a rather slender, mostly slightly curved, obtuse, and usually flattened the tips; the larger ones, bordering the ambulacra, are mostly wide flattened, and canaliculate at the tip; those within the grooves are ve slender, and often capitate; the longer spines of the lower side are 6 to 8^{mm} in length, and much flatter toward the end. Color of spines, alcohol, dark greenish brown or olive-green; test, yellowish brown. T ovaries are composed of rather large lobules, looking like immatu clusters of grapes, and containing large ova. A specimen measu from centre to anterior emargination, 18.5^{mm}; to border of anterior int ambulacra, 21^{mm}; to posterior end, 20^{mm}; to lateral border, 18^{mm}; to e of antero-lateral ambulacral grooves, 15^{mm}; to end of posterior on 15^{mm}; breadth of antero-lateral grooves, 5 to 5.5^{mm}; of posterior on 4.5^{mm}; depth of each, 5^{mm}; height of test, 21^{mm}; of anal area, 6.5 breadth of latter, 4.5^{mm}.

The specimens regarded as males are also cordate, and decided emarginate in front, but the form is more elliptical, owing to the am tus being narrowed opposite and in front of the antero-lateral ambu cra, so that the width decreases nearly equally from the middle, thou somewhat more so posteriorly. The interambulacra are less swolle and consequently the abactinal area is less sunken. The anteri ambulacral furrow is decidedly sunken, though somewhat less so th in the female; but the four other ambulacra are narrower and ve much shallower than in the female, being but little deeper than t anterior odd one, with the sides sloping gradually to the central lin while in the female the sides of the grooves are perpendicular, or eve overhanging, with a broadly-rounded bottom. The three genital ope ings are only about half as large as in the female. In the character the spines, tubercles, peripetalous fasciole, anal area, plastron, actin area, and lower lip, the two forms agree very closely.

Kerguelen Island, 7 fathoms; Dr. J. H. Kidder.

On most of the specimens were several specimens of a small biva shell (*Lepton parasiticum*, Dall) most frequently attached to the und surface, near the mouth. This is evidently a case of "commensualism for the mollusk is not a genuine parasite but a "messmate" of the ec noderm.

The specimens of this species described as *females* have some resemblance to *H. cavernosus*, A. Ag.* (*Tripylus cavernosus*, Phil.), from Patagonia, which is the nearest allied form hitherto described. The latter differs, however, in its pentagonal or elliptical form, less emarginate in front, the anterior ambulacrum being but slightly sunken; in having the anal area elliptical and pointed at both ends; the peripetalous fasciole less angulated laterally; the tubercles of the lower surface larger, etc.

The specimens regarded as *males* resemble to about the same extent *H. australis*, A. Ag.† (Phil. sp.), also from Patagonia. The latter differs in being scarcely emarginate anteriorly and not cordate, in having the fasciole less angulated laterally, etc. The two forms from Patagonia differ one from the other in the same way as do the two supposed sexes of *H. cordatus* described above, so that, if my view be correct, the two forms described by Philippi will prove to be only the two sexes of one species for which the name *australis* would be the most appropriate. In *H. cavernosus* the genital pores are large, and the lateral ambulacral grooves are deep. In *H. australis* the genital pores are small, and the ambulacral grooves shallow. It is also probable that the sexes may differ in a similar manner in other related genera.

ASTERIOIDEA.

ASTERIAS RUPICOLA, Verrill, s. n.

A small species, with five short, broad, rapidly tapered rays, but little longer than the radius of the disk. Disk rather thick and swollen, relatively large. Rays swollen, convex above, flat below, broad at base, where the breadth is often equal to half the total length, measuring from the mouth. The longer radius is from two to two and a half times as great as that of the disk. The ambulacral furrows are broad, with very numerous, closely crowded, slender sucker-feet. The grooves are bordered by a single and very regular row of slender, slightly clavate, obtuse adambulacral spines, which are generally spread outward from

* Revision of the Echini, part iii, p. 587, pl. XXI^c, figs. 1 and 2, 1873.

† Op. cit., p. 586, pl. XXI^c, fig. 3. It is proper for me to state that after the above description was in type, Mr. A. Agassiz, to whom I had sent a specimen of each of the forms for examination, wrote to me that he thinks them identical respectively with the two species of Philippi here referred to, notwithstanding the differences noted. I have thought it best, however, to keep them separate until a larger series of specimens of the American species can be studied.

the grooves at a wide angle. Beyond these there is a longitudinal series of larger and stouter obtusely conical ventral spines, arranged in divergent clusters of two to four. Between these and the adambulacral series there are a few scattered spines and a series of large branchial papillæ, mostly placed singly; but above them the papillæ are numerous, mostly crowded in clusters of four to six, both on the sides and dorsal surface. Along the sides of the rays and separated from the ventral series by a wide space there is a row of plates a little more prominent and larger than the rest, bearing spines that are a little larger and more elongated; otherwise the spines are irregularly scattered, and nearly uniform in character, over the upper surfaces of the rays and disk. These spines are small, short, with obtusely rounded, and usually swollen, rough tips; they mostly arise singly from the dorsal plates, which are thin and flat, and rather closely united together. Madreporic plate nearer the centre than the edge of the disk, small, inconspicuous, rather sunken, composed of few convolutions. Major pedicellariæ few, mostly situated along the inner border of the ambulacral grooves, longovate, with obtuse tips; minor pedicellariæ few, with appressed spatulate or broadly rounded valves; they do not form wreaths around the spines, but are mostly placed singly on the naked spaces between them, especially on the sides and ventral surface of the rays. Color of alcoholic specimens, dark reddish brown above, yellowish beneath.

One of the largest specimens measures from mouth to edge of disk, 12^{mm}; mouth to tip of rays, 30^{mm}; breadth of rays at base, 12^{mm}; length of adambulacral spines, 2.5^{mm}. Smaller specimens have the rays relatively stouter and broader.

Kerguelen Island, on rocky beach, common; Dr. J. H. Kidder, 1874.

OPHIUROIDEA.

OPHIOGLYPHA HEXACTIS, E. A. Smith.*

Annals and Magazine of Natural History. Vol. 17, iii, February, 1876.

Disk hexagonal, with very shallow notches at the bases of the six rays; upper surface slightly swollen, covered with numerous irregular,

* This species had been described as new, under another name, but the description by Mr. Smith was received while correcting the proof. Although there seems to be no question as to the identity of the species, my specimens differ slightly from those described by Mr. Smith. Therefore I have allowed the description to remain, without change.

In the article referred to Mr. Smith also describes the following species from Kerguelen Island; *Asterias meridionalis*, Perrier; *A. Perrieri*, S.; *Pedicellaster scaber*, S.; *Othilia spinulifera*, S.; *Pteraster affinis*, S.; *Porania antarctica*, S.; *Astrogonium meridionale*, S.; *Leptychaster kerguelenensis*, S.; *Ophiacantha vivipara*, ? Ljung.; *Ophioglypha brevispi-*

unequal, and rather small convex scales, among which the primary ones may be distinguished by their somewhat larger size; radial shields small, wide apart, more or less encroached upon on all sides by the surrounding scales, the exposed portion being rounded or oval; there is a group of a few small scales in the notch at the base of the arms, but neither the notches nor the arm-plates are bordered with papillæ. Lower surface of the disk covered with irregular, flattened scales. Genital slits, with a series of very numerous small, grain-like papillæ along the outer edge, and extending around the upper end and a short distance down the inner margin; on the middle of the outer margin they are crowded in three or four rows, but around the outer end they form a single row. Arms six, about twice as long as the diameter of the disk, convex above, rapidly tapering from the base to the tip. Upper arm-plates, near base of the arms, short, more or less concealed laterally by a group of three or four small, irregular, imbricated scales, on each side, which usually do not extend across the arm, and toward the middle of the arm these are reduced to a single small, triangular scale, and this also soon disappears; toward the middle of the arm the upper plates are nearly as long as broad, the outer and inner edges being nearly parallel and slightly curved; farther out they become longer than broad, and irregularly hexagonal, the proximal end narrowest. Arm-spines three, rather short, subfusiform, tapering to a blunt point, the upper one a little the largest, the length about equal to that of the upper arm-plate toward the base of the arms, but shorter toward the end. Under arm-plates transversely elliptical, with a distinct angle in the middle of the proximal edge, where the lateral plates do not quite unite, leaving slight pits toward the base of the arms. Tentacle-scales, beyond the middle of the arms, single, short, flattened; from about the eighth to sixteenth joints there are two tentacle-scales, the inner one becoming quite small before disappearing; on the second to seventh joints there are mostly three tentacle-scales, the inner one quite small; on the first, and sometimes on the second joint, there are four tentacle-scales, and also a similar group of three or four scales on the opposite border of the tentacle-pores. The outer oral tentacle-pore is very large, in the form of a broad, oblique fissure, occupying more than half the length of the jaw, bordered externally by a row of about five flattened, squarish scales, of which the distal one is largest, and an inner row of four or five smaller ones, of which the proximal ones are situated within

and below the border of the mouth-slits. The mouth-papillæ consist of two small, conical, pointed ones at the angle of the jaw, below the teeth, and of an irregular row of two to four smaller ones on each side, running outward and downward below the proximal papillæ of the upper oral tentacle. Teeth, seven to nine on each jaw, stout, obtuse, the series often double in the middle. Mouth-shields broad, spade-shaped, the broad proximal portion terminating in an obtuse point, the somewhat narrowed distal portion extending outward in the interradial spaces about half the total length and broadly rounded at the end. Side mouth-shields long and narrow, somewhat enlarged at the ends, narrower in the middle. The oral tentacles are very large in the alcoholic specimens, projecting inward beyond the ends of the mouth-slits, and nearly filling them up; they are divided into a series of lobes by transverse constrictions.

Color of alcoholic specimens very dark slate-brown above; yellowish brown beneath.

One of the larger specimens measures, across the disk, 18^{mm}; length of arms from dorsal notch, about 35^{mm} (tips broken off); diameter at base, without spines, 2.25^{mm}; length of spines, 1^{mm}.

Kerguelen Island, five fathoms; Dr. J. H. Kidder.

This species differs widely from all the previously described species of *Ophioglypha*, in having six arms, in the shallow notches at the bases of the arms, and in the characters of the mouth-papillæ and mouth-shields, but in size and general appearance it somewhat resembles some varieties of *O. sarsii* of the North Atlantic. In several respects it is related to *Ophiocten*, but though the surface of the disk is covered with a thin, rough skin, it is not distinctly granulated. Although it would not properly go into either of these two genera, as they are ordinarily defined, it seems most natural to refer it to *Ophioglypha*, which may easily be emended in respect to some of the characters that may now be regarded as merely specific.

ASTROPHYTON AUSTRALE, Verrill, s. n.

Disk unevenly granulous, with ten prominent radiating ribs, starting near the center and extending to the lateral bases of the arms; they are broadest and highest near the outer end, which is gently sloped and evenly rounded. The ribs bear four to ten or more unequal,

large, stout, blunt spines, with rugose tips, arranged irregularly in one or two rows, or scattered unevenly, while there is usually a group of from three to six smaller spines on the spaces between the ribs at the bases of the arms, and often one or two on the interbrachial spaces, near the edge of the disk. Similar small, blunt spines, or tubercles, extend along the dorsal surface of the arms, either in single or double rows. The grains covering the disk and upper and lateral surfaces of the arms are quite uneven in size and prominence, with more or less numerous small, flattened plates or scales scattered among them, and in many parts these scales are more regular, with the grains arranged around their borders, this condition being most apparent on the arms; the prominent tubercles and spines are developed from the center of similar scales or plates. The under side of the disk is more regularly granulous. The arms are rather slender and well rounded dorsally, dividing first at about their own diameter from the ends of the radial ribs; the distance from the first to the second division of the arms is about equal to the larger radius of the disk; and from the second to the third usually somewhat greater. The terminal divisions are numerous and very slender. The arm-spines, toward the base of the arms, are small, stout, fusiform, terminated by two acute spinules, and form transverse rows, usually from five to seven, but farther out they became shorter and stouter in rows of two to four; still farther out the two or three terminal spinules become curved, and near the ends of the arms they have the form of minute hooks.

Color of one dried specimen uniform brownish yellow; of the other light grayish brown, with many narrow transverse bands of darker brown across the arms and radial ribs, changing into irregular streaks and spots of the same color on the interradial spaces.

The larger specimen measures, from center to end of radial ribs, 16^{mm}; center to edge of interbrachial spaces, 13^{mm}; center to first division of arms, 21^{mm}; diameter of arms near base, 5^{mm} to 6^{mm}; beyond first division, 4^{mm}; beyond second division, about 3^{mm}; diameter of larger spines on radial ribs, 2^{mm}; height, 2^{mm}.

Pearson's Point, D'entricasteaux Channel, Tasmania, seven fathoms, clinging to *Primnoella australasiæ;* Capt. Ralph Chandler, (Poughkeepsie Soc. Nat. Science.)

ANTHOZOA.

ALCYONARIA.

ANTHOPODIUM AUSTRALE, Verrill, s. n.

Polyp-cells cylindrical or somewhat clavate, with eight distinct sulcations at summit, in contraction; the surface covered with small, roughish spicula; the height variable up to a quarter of an inch or more. They arise from a thin encrusting or stolon-like cœnenchyma, which is coriaceous and roughened with spicula, like the polyp-cells. The polyps are irregularly scattered along the cœnenchyma, which creeps over the upright axis of *Primnoella*. Color, light orange-red. Height of polyp-cells, mostly 2mm to 6mm; diameter, about 1.5mm.

The spicula are small, but exceedingly variable in form, and most of them are covered with rough or even lacerate warts, which interlock and thus strengthen the tissues; many of them are flattened. The largest spicula, and perhaps the most abundant, are oblong, two to four times as long as broad, obtuse at the ends, and thickly covered with rough spinulose warts; others are enlarged and irregularly flattened at one end, which is covered with rough laciniate spinules and warts; others, equally rough, are shorter and sometimes irregularly rounded, about as broad as long; irregular rough laciniate crosses are not uncommon; and there are numerous slender fusiform spicula, acute at the ends, about as long as the largest ones, but not half as thick, and less roughly warted; various other more or less intermediate forms also occur.

Bluff Harbor, New Zealand, on *Primnoella australasiæ;* Dr. E. Kershner.

This species is more nearly allied to *A. rubens*, V., from North Carolina, than to any other species known to me.

PRIMNOELLA AUSTRALASIÆ, Gray.

Primnoa Australasiæ, Gray, Proc. Zoölog. Society of London, 1849, 146, pl. 2, figs. 8, 9; Annals and Magazine of Nat. History, 1850, 510.

Primnoella Australasiæ, Gray, Proc. Zoölog. Society of London, 1857, 286; 1859, 463; Catalogue of Lithophytes or stony corals in the collection of the British Museum, 50, 1870.

The specimens are simple, cylindrical stems, some of them more than three feet in length, with the base attached to shells. The polyp-cells are elongated, cylindrical, arranged in close whorls, and closely appressed

o the surface of the stem, with the summit incurved and mostly con-ealed. There are sixteen to twenty-four or more cells in a single whorl, and the successive whorls are so crowded as to leave only a narrow line between them, except toward the base, where the polyp-cells become shorter and imperfect, leaving spaces often equal to their length between the whorls; in these places the cœnenchyma is covered with small imbricated scales, similar to those of the cells. On the outer or exposed surface of the cells there are two alternating rows of imbricated scale-like spicula, ten to twelve in each row.

The axis is slender, round, tapering from the base to the tip, where it becomes very slender and translucent yellowish horn-color, while toward the base it is dull grayish brown, opaque, rigid, and stony; the middle portion is grayish or ash-color, and sometimes whitish; its surface is sulcated with numerous slightly impressed grooves. Color of the cells and cœnenchyma, yellowish white.

One of the larger specimens, imperfect at the tip, is about 36 inches (915^{mm}) long; greatest diameter, 4^{mm} to 5^{mm}; diameter of axis near base, 2.5^{mm}; length of cells, 2^{mm}.

Bluff Harbor, New Zealand; Dr. E. Kershner; several specimens.

One specimen, from seven fathoms, near Pearson's Point, Tasmania, was sent to me from the Poughkeepsie Society of Natural Science, as received from Capt. Ralph Chandler, U. S. N.

According to the label of the last-named specimen, the native name is "Urialus."

[*Actiniæ* were numerous along the rocky shores of Kerguelen Island. Specimens have been preserved in alcohol, but not in a condition to admit of specific determination, the tentacles being, of course, retracted. All of those seen by me were of small size and sober colors, mostly of a dark brown; with the exception of one rather rare species, expanding to about the size of a silver half-dollar, the tentacles of which were of a brilliant vermilion. J. H. K.]

APPENDIX.

SURGEON E. KERSHNER'S COLLECTION.

MINERALS.

These include forty-two specimens, representing portions of Otago and other parts of New Zealand. A considerable number was obtained from the museum at Otago, being specimens gathered during the geological survey of the province. Of the remainder, most were collected by Dr. Kershner himself. Besides those already mentioned, this collection includes some fine specimens of copper-ore from the mines in Southern Africa. All of the minerals have been identified by Dr. F. M. Endlich, of the Smithsonian Institution, as per list following:

Original No.

Geol. survey of Otago.

19. Pumice (typical specimen).
20. Doleritic rock with zeolites.
21. Chrome-ore (Otago Museum).
22. Hornblende.
23. White quartz.
24. White quartz with decomposed feldspar.
25. Iron and copper ore.
26. Same as 20.
27. Pyrite and mica in chloritic schist (Otago Museum).
28. Chalcopyrite (Otago Museum).

29–40. Bornite (copper-ore) associated with quartz.

41. Quartzitic rock impregnated with pyrite.
42. Copper-ore.
43. Lignitic coal (Germ. sp. name, Russkohle).
44. Feldspathic rock decomposed into caolinite.
45. Quartzitic rock containing caolinite and impregnated with pyrite
46. Galena and quartz.
47. Druse of natrolite in basalt.
48. Sulphur.
49. Chalcopyrite (copper pyrite).

Original No.

50. Sulphur.
51. Very impure graphite with quartz.
52. Pyrite and quartz.
53. Copper-ore, sulphide and carbonates.
54. Natrolite in basalt.
55. Same as 53.
56. Compact limonite (hydrated sesquioxide of iron).
57. Coal.
58. Chrome-ore.
59. Covellite (copper indigo), copper mineral.
60. Same as 44.
61. Sulphur.
62. Aragonite (carb. of lime), radio-columnar.

Fossils are not determined as yet; nor greenish mineral in basal
Former appear to be carboniferous.

MISCELLANEOUS.

Nat. Mus. No.

14783 } Two skulls, with leg-bones of Maoris, from Chatham Island.
14784 }

14782 Skull of Maori-ori, or Chatham Island aborigine, concerni
which Dr. Kershner writes that it was "picked up from t
surface of the ground, having been exposed to the weathe
It is said that this race never buried their dead, but carri
them out and deposited them in heaps, where they were l
to decay, so that the bones are easily found in many differe
parts of the island. They were cannibals; the remnants
the race now found in the island having been known to pr
tice cannibalism as late as about ten years ago. They n
number only about twenty-five souls, are limited to a reser
tion, and sustained by the colonial government. The na
Maori-ori is said to mean 'before the Maoris,' and indica
that these people, the aborigines of Chatham Island, had b
subdued and, in great measure, displaced by the Maor
It seems not improbable that this race represents also
aboriginal inhabitants of New Zealand, which had quite
appeared before the discovery of the islands by Europea
Chatham Island lies east of New Zealand, at the distance
about six hundred miles, in latitude 48° south.

Nat. Mus. No.

254 } Are stone implements of the Maori-ori; a large cleaver-shaped
255 } stone hatchet and two chisels, also of stone.

Skin and skeleton of *Dasyurus maculatus*. Concerning this animal, Dr. Kershner writes that it was captured in the mountainous part of Tasmania, near Hobarton; and that it is so destructive to young lambs that it is being rapidly exterminated by the colonists, who call it "tiger-cat." The skin is a very fine one, and has been mounted and placed in the museum collection.

478 Skin and skeleton of *Ornithorhyncus paradoxus*, the "beast with the bill." The skeleton is perfect, but the skin has been somewhat curtailed by trimming, and is valuable only as exhibiting the softness and fineness of the fur. Obtained near Hobarton, Tasmania.

Strigops habroptilis, the "owl-eyed parrot" of New Zealand, obtained from Otago Museum by the courtesy of its curator, Captain Hutton. The bird is nocturnal in its habits, burrows in the ground or in holes in the rocks, and feeds upon worms and grubs. It is becoming very scarce since the introduction of dogs and cats into the island.

Buphagus skua antarcticus, shot at Hobarton. Same species as that observed at Kerguelen, the hawk-like habits of which were described in the National Museum Bulletin No. 2. This individual was shot in the act of devouring a tame duck which it had just captured in the yard of a resident of Hobarton. It is said even to attack young lambs, and to be very destructive to domestic fowls.

Skin of king-penguin (*Aptenodytes longirostris*) obtained at Kerguelen Island, but really captured on the Falkland Islands.

A large collection of bones of the moa (*Dinornis*), the great extinct New Zealand bird, from Christ Church (Middle Island), New Zealand. These have not yet been put together or carefully examined.

15485 Head and fins of *Trigla*, *sp.*, from Port Arthur, Tasmania. A fish nearly allied to and much resembling the "sea-robin" of the New England coast.

15484 Mutilated skin of *Aracana*, *sp.*, from Hobarton, a fish closely resembling the trunk-fish (*Ostracion*).

No.

Hippocampus, sp. Port Chalmers, New Zealand. Of very u
usual size.

Anguilla aucklandii, Richardson, from Bluff Harbor, New Ze
land. An enormous eel.

In the subkingdom MOLLUSCA, Dr. Kershner's collection is pe
liarly rich, including large series of shells from New Zealan
Tasmania, the Auckland and Chatham Islands, besides a ve
handsome *Cephalopod* (*Ommastrephes*), preserved in alcoh
The shells are now undergoing examination by Mr. W. H. D
al

The botanical collections, also very large, include specimens
the "Ake-aka," an aromatic wood from Chatham Island, a
of the seeds of the "Kapu-kapuka" or Chatham lily (*My
tidium nobile*, Hooker), a flower greatly prized for its beau
ty.
The lily grows only on the verge of the sea-beach, in sh
dy
places, in a soil composed of rich mold mixed with sand. If
cultivated in gardens it should be watered with salt-wa
er.
Besides these are series of ferns from all the localities visit
ed,
and a considerable collection of flowering-plants from the
Auckland Islands. The plants have been sent to Cambridge for
identification; the woods are at the Agricultural Departm
nt,
Washington.

The collection of plants from the Auckland Islands was ta
ken
from the neighborhood of the German transit-station at that
place, the same locality occupied by Sir James Clarke Ross
when at the Aucklands in 1841, in the Erebus and Terror.

The *Crustacea*, which have been identified by Prof. S. I. Smith,
are found to be as follows:

2209 *Heterograpsus sexdentatus*, Edw.
Petrolisthes elongatus, Stimp.

2210 *Livoneca*, near *emarginata*, Bleeker. An isopod parasitic upon
fish.

The following note upon some interesting hydroids found in Dr. Kersh
ner's collection is given as received from the writer, Mr. S. F. Clark, of
Yale College:

HYDROIDEA.

"Among the invertebrates sent to New Haven, for identification,
Dr. Kidder, is a fine specimen of a pedunculated ascidian, belonging
the genus *Boltenia*. This same genus is represented on the New E

land coast by the species *Bolteni*, the stems of which are the favorite abiding-places of many hydroids; and it is interesting to note that the three genera, *Sertularia*, *Sertularella*, and *Lafoëa*, which are almost invariably represented on our New England species, are also represented on the stem of this southern specimen.

"The species of *Sertularia* is very close to, if not identical with, *S. operculata* of Linnæus; but there being no gonothecæ present on either of the three species, I shall not attempt to make specific determinations.

"The genus *Sertularella* is represented by a species resembling in mode of growth the *S. tricuspidata* of Alder. Hydrothecæ alternate, stout, and with a tricuspid rim. Possibly this is identical with the *Sertularia johnstoni* of Murray. (Dieffenbach's New Zealand, London, 1843.)

"The third species is probably a member of the genus *Lafoëa;* it is a creeping form, and many of the hydrothecæ have only their upper portions free, the lower portions reclining upon the stolon. The ascidian bearing these hydroids was collected at Port Chalmers, New Zealand, in January, 1875, by Dr. E. Kershner, U. S. N."

II.

A considerable collection was also made by Mr. Israel Russell, one of the photographers to the New Zealand party, mostly from the province of Otago, New Zealand. Mr. Russell's collection includes a number of Maori implements, with some supposed to belong to a still older race (perhaps the Maori-ori). His bird-skins represent specimens of *Larus dominicanus* ♀, *Daption capensis*, *Casarca variegata*, Gm., *Podiceps cristatus* (*australis*, Gould) ♂, *Porphyriops crassirostris*, Gray, *Creadion carunculatus*, and two pigeons and a parrot, as yet undetermined. Besides these, there are a number of New Zealand birds preserved in alcohol, and a large collection of the bones of the moa.

Other departments of natural history are well represented in Mr. Russell's collection. There are a large number of fossil shells from Lake Wakatipu, New Zealand, and of recent forms from the same pit in which the Maori implements were found. Also, a considerable collection of plants, and of insects, *Crustacea*, and small vertebrates which have not yet been studied.

III.

Mr. Edwin Smith, United States Coast Survey, chief of the Chatham Island party, sends three skulls, two of Maoris and one of a Maori-ori, for the authenticity of which he vouches.

"TH REFERENCE TO ITS STRUC-
MATIC POSITION.

S., AND ELLIOTT COUES, U. S. A.

Inochorus, Attagis, and *Chionis*] is one of those which,
families, although at present offering only difficulties
ltimately may assist in revealing the grand scheme,
ast ages, on which organized beings have been created."
ralist, New York, 1871, *p.* 94.)

CHIONIS MINOR, *Hartlaub.*

SHEATH-BILL; BEC-EN-FOURREAU.

HISTORY.

s *Chionis* was founded by J. R. Forster in 1788,* upon *C. alba*,
d by him in the neighborhood of Cape Horn. In January,
r. G. Hartlaub wrote from Bremen to the Revue Zoölogique †
e had discovered a new species of *Chionis* in the museum at Ley-
. He described it as differing from *C. alba* by its decided inferi-
y in size, by the blackness of the entire beak, and particularly by
extraordinary shape of the sheath of the bill. His original descrip-
n and measurements are as follows:

"CHIONIS MINOR, *Nob.*, *nivea, rostro nigerrimo, pedibus saturate fuscescentibus, spatio supraoculari subrotundo, nudo, nigro, rostri vaginâ subcarnâ, antrorsum ascendente, apertâ* (*in Ch. albâ, planâ, incumbente*).

	C. minor.		*C. alba.*	
q. total	13 *p.*	2 *lig.*	17 *p.*	3 *lig.*
rostri à fronte	1	2	1	4
it. rostri ad basin		7		8
tud. rostri ad angulum oris	0	6½		7½
g. alæ	9		10½	
tarsi	1	10	1	11
cauda	4	3	5½	
digiti medii	1	8	2	1

* Enchiridion Hist. Nat. Ins. 1788, p. 37.

† Rev. Zoöl., 1841, n. 5; *ib.* 1842, pl. 2, fig. 2.

"*Patrie inconnue.*"

In the following year he contributed a drawing (of the head) to t[illegible]e same periodical (pl. 2, f. 2).

In 1849 *C. minor* was figured by G. R. Gray,* under a description [illegible]of the genus which was placed by him in the fifth family (*Chionididæ*) [illegible]of *Gallinæ*, the other members of the family being *Thinocorus* and *Attag*[illegible]*s*. The supposed relationship between these birds was first pointed out, [illegible]so far as we know, by Mr. Darwin,† in 1833, when, referring to *Thinocor*[illegible]*s*, *Attagis*, and *C. alba*, he utters the pregnant sentence we have chosen [illegible]as the motto for this essay.

De Blainville meanwhile, in 1836,‡ before *C. minor* had been describ[illegible]d, turned his attention to the anomalous relationships of the genus, a[illegible]nd decided that its nearest affinity was with *Hæmatopus*. The position [illegible]e assumed respecting its relationships requires special considerati[illegible]n, since it was defended with learned ingenuity and has been generally [illegible]ac-cepted without question.

He based his conclusion upon the examination of a skeleton of t[illegible]he trunk of *Chionis alba*, obtained from M. Baillon, of Abbeville, with so[illegible]me details of its internal organization and natural history obtained fr[illegible]om M. P. E. Botta, one of his assistants at the Paris Museum. M. Bott[illegible]a's specimen had come on board of a ship, during a commercial voy[illegible]age around the world, in latitude 55° south, longitude 64° west (betwe[illegible]en the Falkland Islands and Cape Horn). Previous to this time specime[illegible]ns had been exceedingly rare, only three skins being known to exist, a[illegible]nd no anatomical material being accessible.

M. de Blainville enumerates, among those who had already trea[illegible]ted of *Chionis*, Forster, Pennant, Latham, Gmelin, Bonnaterre, Illig[illegible]er, Vieillot, Oken, Temminck, Goldfuss, l'abbé Ranzani, Quoy & Gaima[illegible]rd, Lesson, Wagler, Cuvier, and Isidore-Geoffroy. By these writers it h[illegible]as been successively and alternately considered as a wader (*échassi*[illegible]*er*), palmipede, and gallinaceous bird, allied (*rapproché*) to three differ[illegible]ent genera, or considered as a distinct family; while it had been pas[illegible]sed over by other naturalists, who did not consider the data sufficiently [illegible]full for a determination; or held to be *incertæ sedis*, "*ce qui est, en pareil c*[illegible]*as, le parti le plus convenable.*"§

* Genera of Birds, 1849, p. 522, pl. —.

† Naturalist's Voyage around the World, p. 94; cf., also, Voy. Beagle, 4to, 1841, [illegible]p. 118, 119.

‡ Mémoire sur la place que doit occuper dans le système ornithologique le ge[illegible]nre *Chionis* ou Bec-en-fourreau. < Ann. Sci. Nat. vi, 1836, p. 97.

§ De Blainville, l. c.

The three specimens then known to De Blainville were, first, a skin in an English collection, for a long time unique (perhaps Forster's type); second, one obtained by MM. Quoy & Gaimard from the voyage of the Astrolabe, in 1824; third, one obtained by MM. Lesson & Garnot, in the course of the voyage of the Coquille, when an individual came on board of the ship "at the distance of eighty leagues from Patagonia, the nearest land." "Anderson observed it in flocks in Christmas Harbor," but appears to have given no description by which the peculiarity of the Kerguelen species (*C. minor*) was recognized, and of which this is the first recorded observation.

M. de Blainville describes briefly the external parts of *C. alba*, and the skeleton, the latter including of the skull only the posterior part without the occiput, and being defective also as to the coccyx and limbs. He appears not to have seen either the muscles or viscera, but to have been dependent for his brief description of the latter upon the sometimes erroneous recollections of M. Botta. It should be noticed that the observations upon the natural history and habits of the genus had been made upon specimens that flew on board of ships at sea, and therefore were not under their natural or wild conditions.

His reasons for referring the genus to the vicinity of *Hæmatopus* are summed up by himself (p. 106) as follows:

"1°. Le nombre des vertèbres 15—6—14—8, est le même.

"2°. Le nombre et la forme des côtes sont les mêmes.

"3°. Le sternum, de même forme générale, a deux échancrures subégales, la supérieure un peu plus grande que l'inférieure.

"4°. Le canal intestinal a également trois cœcums, dont deux terminaux médiocres et un median fort petit.

"5°. L'estomac est également formé d'un gésier fort petit sans jabot.

"6°. La queue est courte et composée de six paires de pennes égales.

"7°. Les ailes, formées de dix pennes à la main, sont aiguës.

"8°. Les jambes sont peu élevées, et nues seulement vers le talon.

"9°. Les tarses, non comprimés, sont également réticulés en avant comme en arrière.

"10°. La plante des doigts est élargie de manière qu'ils semblent bordés latéralement.

"11°. Ce sont également des oiseaux marcheurs et coureurs;

"12°. Habitant les rivages de la mer;

"13°. Où ils cherchent leur nourriture, consistant en coquillages et peut-être en animaux morts."

Since M. de Blainville relied almost entirely upon the characters of the sternal apparatus* in the classification of birds, it is not strange that he should have found in their resemblance to those of *Hæmatopus* conclusive evidence of natural affinity. The errors of omission and of observation in the above summary (which, it must be acknowledged, are not to be found in the description of those parts seen by De Blainville himself) will be discussed hereafter in their proper connection.

In his continuation of Bonnaterre's "Tableau encyclopédique et méthodique d'Ornithologie" (pp. 1037, 1038), M. L. P. Vieillot speaks of the *black button* on the wing, and describes the sheath of the bill as sometimes yellow, *sometimes black*. It would thus appear that *Chionis minor* was known and had been examined long before Hartlaub differentiated the species; this black color of the epidermal outgrowths being one of the principal specific features of his diagnosis. Bonnaterre's first mention of the genus (as genus 83 of his list, p. cxiij) gives no points to indicate whether he was describing *C. alba* or *C. minor*.

In 1867 Mr. E. L. Layard, writing to the Ibis† from Cape Town, under date of June 17, mentions several specimens of *C. minor* brought alive to the Cape from the Crozet Islands by Captain Armson. "A single egg obtained by him was unfortunately attacked by mice on board; but enough remains to show its contour and color. The instant I saw it I was reminded of the eggs of *Hæmatopus*." He describes the egg at some length, and of the living bird says: "He is most *Hæmatopus*-like in his motions, moving with great swiftness, and feeding on meat, which he holds down between his feet and tears into shreds. He is very fearless, and attacked the cats which came near him. The legs are livid brown [!], bill black, with a pink cere around the eye, the iris of which is deep black or dark brown in color."

On the 28th of November, 1867,‡ Dr. P. L. Sclater exhibited to the Zoological Society a skin of *Chionis minor*, "being that of an individual of this species which had been transmitted living to the society by E. L. Layard, and brought from the Crozet Islands by Captain Armson." This was doubtless the same individual referred to by Mr. Layard in the passage just quoted.

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* À ces élémens les plus importans d'une évaluation un peu positive des rapports naturels de cet oiseau (*puisque j'ai montré, depuis long-temps, que l'appareil sternal, avec ses annexes, les renferme dans cet classe d'animaux*)' j'ai pu joindre quelques détails d'organization intérieure, etc." (*Op. cit.*, p. 99.)

† Ibis, 1867, p. 458.

‡ Proc. Zool. Soc. 1867.

October 26, 1868,* the receipt of two specimens of *C. minor* by the Zoological Society, from Mr. Layard, was recorded without further particulars. They came from the Crozet Islands.

In the Journal of Anatomy and Physiology for November, 1869,† appeared a letter from R. O. Cunningham, M. D., naturalist to Her Majesty's surveying-ship Nassau, with a figure of the cœca, part of the intestine, the stomach, and larynx of *Chionis alba*, accompanied by some measurements. He found that "the legs present a decided resemblance to *Hæmatopus*, and the sternal characteristics are similar."

An egg of *C. minor* was received by the Zoological Society, January 17, 1871,‡ concerning which Prof. Alfred Newton said: "No egg of either species of this genus had before been known, and this confirms, by its appearance, the systematic position of the form shown by osteology, its affinity, namely, to the plovers."

We have been able to find a record, therefore, of but four specimens of this species, viz: 1. That in the Museum at Leyden, from which the original description was made, of unknown locality; 2. A specimen sent to the Zoological Society by Mr. Layard, from Cape Town, brought from the Crozet Islands; and, 3, 4. Two specimens from the Crozet Islands, also sent to the Zoological Society by Mr. Layard, in 1868.

The literature of the species is meagre, and we do not find that any attempt has been made either to verify or refute De Blainville's conclusions, otherwise than by inspection of external characters, beyond Mr. Cunningham's brief notes upon the digestive system. Authors who have differed from De Blainville respecting the systematic position of the genus have simply placed it where they pleased, apparently without feeling called upon to show cause for the faith that was in them.

The late expedition to observe the transit of Venus at Kerguelen Island afforded an opportunity to improve our acquaintance with this species, which was taken advantage of. Several specimens were preserved in alcohol, a number of skins were secured, and, during a stay of four months upon the island, as frequent and careful observations as possible upon the behavior of the bird during life§ were made by Dr. Kidder.

It bears a strong resemblance to the pigeons in form and mode of

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* Proceedings Zool. Soc. 1868.

† Pp. 87–89.

‡ Proc. Zool. Soc. 1871, p. 57.

§ See Bull. No. 2, Nat. Mus. 1875 . 1 *et seq.*, for full description of habits, etc.

flight; is easily domesticated, remarkably fearless of man, dislikes wa-
ter, cannot swim, is largely a vegetable-feeder, and its usual note is a
harsh croak. These characteristics, taken together with its attitudes,
gait, pugnacity, ready companionship with domestic fowls, and some
obvious peculiarities in the structure of the digestive system, seemed to
indicate affinity with the *Gallinæ* rather than with *Hæmatopus*, so far as
superficial characters have weight. And so strong was this impression,
based upon field-observation only, in the mind of the observer, that we
have made a somewhat extended anatomical examination of two of the
alcoholic specimens, and have studied the slender literature of the sub-
ject, with the hope of furnishing the materials upon which to base in-
quiries that may establish the proper position of this confessedly doubtful
group. Allowing due weight to the authority and great name of De
Blainville, it is proper to remember that this particular species (*C. minor*),
at least, differs from the type-species (*C. alba*), as described, in that it is
largely a vegetable-feeder; that there is no record of its having been
seen "far out at sea";* and in the characters upon which the diagnosis
of the species is based.

For comparison with Hartlaub's original description, the field-meas-
urements of eleven specimens are here quoted:†

List of specimens, with measurements.

Smithsonian Institution number.	Original number.	Date.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Tarsus.	Middle toe.	Longest claw.	Remarks.
		1874.											
68956	27	Oct. 12	♂	15.50	30.50	9.00	.....	1.50	1.35	2.00	1.85	0.50	Skin.
68957	31	Oct. 16	♀	14.00	29.00	8.50	.....	1.35	1.65	1.85	1.60	0.45	Do.
68955	32	Oct. 16	♂	15.00	31.00	9.50	.....	1.50	1.60	1.80	1.60	.....	Skin with sternum.
.....	33	Oct. 18	♂	.....	.....	.....	.....	.....	.....	.....	.....	.....	Disemboweled and in alcohol.
68958	67	Nov. 14	♂	15.75	32.00	9.35	.....	1.50	1.75	1.75	1.60	0.40	Skin.
.....	127	Dec. 5	♂ (?)	15.00	30.00	9.00	4.65	1.45	.....	1.65	1.55	0.50	Alcohol.
.....	146	Dec. 11	♂ (?)	14.50	29.00	8.50	.....	.....	.....	1.75	1.50	0.50	Do.
.....	203	Dec. 29	♂ (?)	16.50	30.50	9.00	4.85	1.50	.....	1.85	1.75	0.50	Alcohol and carbolic acid.
.....	204	Dec. 29	♀ (?)	15.25	29.15	8.85	4.50	1.35	1.65	1.75	1.65	0.50	Do.
.....	205	Dec. 29	♂ (?)	15.50	29.85	8.85	4.75	1.35	1.65	1.75	1.55	0.45	Do.
.....	206	Dec. 29	♀ (?)	15.75	28.85	8.50	4.75	1.35	1.75	1.75	1.65	0.50	Do.

* *Vid.* Darwin, Voy. round the World, p. 94, and Cunningham, Jour. Anat. and Phys. 1869, p. 88.

† From Bull No. 2, Nat. Mus., *loc. cit.*

DESCRIPTION.

The first specimen selected for examination was taken from alcohol ovember 5. The field-measurements, from the flesh, are as follows:—

number.	Original number.	Date of collection.	Sex.	Length.	Extent.	Wing.	Tail.	Bill.	Head.	Toes.	Middle toe.	Longest claw.	Remarks.
--	146	1874. Dec. 11	♀	14.50	29.00	8.50	.....	.....	.....	1.75	1.50	0.50	Preserved in alcohol.

Plumage universally pure white, very soft and downy. Under plumge slate-colored. Bill black, stout, conical; mandibles of equal length. hord of culmen 1.22, gape 1.35, depth 0.80, width 0.55; depth of upr mandible 0.37, width 0.40; depth of lower mandible 0.30, width 55. Commissure nearly straight, with only a slight downward curve wards apex of bill. Lying over the upper mandible like a saddle, ith the pommel tilted up into the air, is the horny black sheath which as given to this bird one of its trivial names. From the insertion of he frontal feathers to its anterior end, this sheath measures 0.50. The aps of the saddle project downward and backward below the tomial ine, its anterior margin presenting two curves, convex forward, including one curve, convex posteriorly. The "pommel" part of the sheath rojects above the mandible, like a hood, 0.20 inch. From gape to apex he sheath measures 1.00; perpendicular depth 0.70, width of "pommel" 0.30, of sheath between lower margin of flaps 0.45. At the sides the flaps are firmly soldered to the upper mandible, so that, in this species at least, erection of the sheath (attributed to *C. necrophaga* or *C. alba* by Latham, Lesson and Cuvier,*) is impossible. Structurally continuous with the sheath, and extending backward and upward from its posterior portion, is a thick, black, tumid strip of naked skin, deeply pitted by numerous follicular openings, some of which near the edges give passage to hair-like feathers. It lies in contact with the eyelid superiorly, and the portion uncovered by feathers measures 0.55 by 0.30. Upon clipping away the frontal feathers, this black caruncle is found to extend entirely across the forehead, as a squarish frontal hood, covered by white feathers so thickly as to be invisible in its anterior and central two-thirds. Its upper margin (somewhat wider than the lower) is abruptly distinct, just opposite the highest part of the eyelid. The width of the caruncle at its upper and widest part is 1.10; its height from the lowest inser-

* Animal Kingdom, London, Orr & Co., 1849, p. 250.

tion of the feathers is 0.70. As already stated, the sheath is continuous structurally with this caruncular fold, the epidermal tissue of the latter losing its follicles and assuming a horny structure at the wide angle between the forehead and bill. In appearance the structure is strongly suggestive of the frontal papillose casque borne by the turkey* (*Meleagris*). Opposite the central concavity in the sinuous border of the side-flap of the hood appears, uncovered by the sheath, about half the aperture of the nostril, oval in outline, with its long axis nearly parallel with, but inclining slightly toward, the rictus. The nostrils are pervious. The eyelids are thickened and everted, during life of a pale pink, whence the name "sore-eyed pigeon." Iris, dark-brown to black.

The body is full and heavy. When at rest the head is withdrawn toward the body and the tarsi are nearly concealed by the plumage. Plumage universally pure white, remarkably soft and downy. "After-shaft" of body-feathers distinct and soft, measuring rather more than half the length of the main shaft. Wing primaries 10; first three about of the same length, the second being, perhaps, a trifle the longest. The inner remiges equal the longest primaries. Tail slightly rounded, spreading widely in flight. Rectrices 12, inner and outer vanes of nearly equal width, innermost being rather the wider.

Tibia is naked for 0.40 inch, but covered to below the joint by extremities of feathers. Tarsus is pale flesh-color, 1.70 inch; stout, flattened on its internal surface; narrower posteriorly than anteriorly; covered by prominent hexagonal scales, which merge gradually into scutellations on the toes anteriorly. Middle toe measures 1.5, longest claw 0.45 inch. A strong and distinct row of marginal scales fringes each toe, and a small web connects bases of third and fourth toes. First toe placed at the inner side of tarsus, distinctly above the level of the rest, and with its under surface directed externally. Claws strong, stout, blunt, convex above, concave and deeply grooved beneath; black above, pale horn-whitish below. Joints stout and large.

DISSECTION.

MUSCLES OF THE UPPER EXTREMITY.

Pectoralis major arises from external border of clavicle in its whole length excepting its coracoid enlargement; from the whole length of

* This extension of the caruncular casque across the forehead, being hidden by feathers, has, we believe, never before been noticed, previous descriptions having mentioned only the obviously naked strip along the eye.

border and about one-half the lateral surface of carina; and he posterior and external third of the body of sternum, to be d by a broad flat tendon into the palmar margin of the pectoral f humerus. The pectoralis major is partly cleft, posteriorly and rly, but the two parts coalesce to be inserted by a single tendon ve.

nd pectoral arises from sterno-clavicular membrane, from the between the body and keel of sternum to within 0.25 inch of its or end, and from all of the body not occupied by the conjoined ts of pectoralis major. It is inserted by a very long cylindrical , gliding through a tendinous sheath given off from the neighbor- f coraco-clavicular articulation, beneath the angle of their junc- to radial tubercle of humerus, 0.50 inch below its articulating . This is the *levator humeri*.

d pectoral ("*pectoralis minimus*" Coues*) arises fleshy, pyram- rom external border near superior external angle of sternum om the adjoining margins of sternum and coracoid, for about rd their length, to be inserted by a round tendon directly into order of humerus, near its head. In origin and function this agrees with *pectoralis minimus* of Coues, and of Owen, 1836 ot with third pectoral of Owen, 1866, being an adductor and l rotator but *not* a levator of humerus; arising from external *not angle*, of sternum; and passing through no trochlear groove, ing inserted by a *straight* tendon into radial tuberosity of s, which it depresses, not elevates).

article in Todd's Cyclop. Anat. describes the third pectoral- tially as it is here given; but in Anat. Vert., ii, 1866, p. 97, tly by some oversight, Professor Owen redescribes the third l in much the same terms as he does the second, making it be a levator.

simus dorsi shows no peculiarity of origin or insertion. Ante- ers are a thin narrow band of pale muscle. Posterior are darker, , and blend, before insertion, with anterior. A few muscular pass downward from sterno-coracoid articulation, parallel with ribs.

sor plicæ alaris arises from coraco-clavicular articulation, send tendon downward along the pectoral ridge of humerus. It is lar in form, covering the rest of the muscles of the shoulder- Just beneath it lies the—

teology, etc., of Colymbus torquatus, Mem. Bost. Soc. Nat. Hist. i, 1866.

Deltoideus, arising from coracoid end of scapula, filling the space between the tendon of pectoralis medius and latissimus dorsi, to be inserted into the pectoral ridge of humerus.

Biceps presents nothing unusual.

Infraspinatus and *teres major** are represented by a single muscle, which arises from the entire dorsal margin of scapula, and is inserted into the ulnar tuberosity of humerus.

A stout fasciculus of soft, dark muscle, which arises from nearly the whole of the internal surface of coracoid and of the adjoining stout strip of membrane, passes outward and upward through humero-coracoid space to be inserted into the anterior tuberosity of the humerus. Perhaps this is the muscle described by Owen† as the analogue of coraco-brachialis, and said by him to "attain its greatest relative size in the *Rasores*, where it arises from almost the whole of the coracoideum."

Triceps extensor cubiti is divided into two distinct muscles, as usual.

Numerous isolated fibres, representing *platysma myoides*, originate from anterior half of clavicle and proceed upward between the layers of the superficial fascia, to be inserted into the skin, superficial surface of œsophagus, and crop.

MUSCLES OF THE LOWER EXTREMITY.

Sartorius as usual.

Rectus femoris and *tensor vaginæ femoris* (*abductor magnus* of Owen) arise thin and fan-shaped, by a membranous aponeurosis from the superficial fascia of the back and from outer margin of sacrum and ischium, to be inserted by *two* tendons, the uppermost going to the anterior part of the sheath of cruræus, the lowermost to the head of fibula. The muscle is very thin and its tendon a delicate aponeurosis.

Glutæi and *cruræus* (including internal and external *vasti*) present no characters of particular interest.

Biceps arises just above inner hamstring muscle from ischium, and is inserted into fibula, fully 0.8 inch below the knee-joint.

Semimembranosus and *semitendinosus* are inserted into tibia at about the same level, above insertion of biceps.

Adductores and *gastrocnemius* not noted as peculiar.

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* *Vid.* Owen, Comp. Anat. and Phys., vol. ii, p. 95. Lond., Longmans, 1866.

† Owen, *l. c.*, p. 97.

The thickening and expansion of the conjoined tendon, just over the posterior part of tibio-tarsal-joint, is very marked, adding much to the lever-power of the muscle.

VISCERA.

On removal of sternum and scapular girdle, the ribs being cut through at a short distance from the sternal margins, only trachea, pericardium, and liver became visible, covering in the rest of the viscera. A considerable deposit of finely granular sabulous matter was found upon the serous covering of the lungs and viscera, which was preserved for future examination. There is no sternal fold of trachea, its bifurcation appearing just above *manubrium sterni*. *Œsophagus* lies beneath and to the right side of trachea. It is dilated into a very wide, triangular, definitely-circumscribed ingluvies, which measures in the alcoholic specimen about 1.50 by 1.00 inch.

Proventriculus is but a slight dilatation of œsophagus, well provided with secreting glands internally. The glands are cylindrical in shape, and some of them measure quite 0.10 inch in length. They are disposed in a zone of unequal width about the proventricular opening of the stomach, extending very much further upward anteriorly than posteriorly, where the lining of the proventriculus soon becomes reticulated. The orifices of the glands are very large, and their general structure and disposition are clearly visible to the naked eye.

Gizzard is elongated, 1.50 by 0.80 inch. Tendinous centres are situated *laterally*, a band of stout muscle passing downward over the anterior and central portion, spreading out over the bottom of the viscus, and curving sharply over posteriorly as a thick fleshy lip, the margin of which sinks into a deep sulcus, concave superiorly, and extending nearly the whole width of the stomach. From the centre of this sulcus passes upward a stout muscular fascicle, diverging as it ascends so as to cover the posterior surface of the stomach, and its sides above the lateral tendinous centers. The duodenum is given off from the right side, 0.50 inch from the lower border of proventriculus. Internally, the stomach is deeply rugous, the rugæ running for the most part axially, but merging in the upper third into a rough pavement of irregular prominences, produced by transverse sulci crossing the longitudinal. The principal grinding surfaces are, as was to be expected from the external arrangement of muscle, anterior and posterior instead of lateral, as usually is the case. The gizzard contained several pebbles, three as large as a grain of coffee, the beaks of two cephalopods, shells of small patellæ, and a considerable mass of pale green vegetable matter.

The small intestine passes out from the gizzard on the right side, curving sharply backward (parallel to spine) for 3 inches, and returning upon itself to the level of its exit from the gizzard. Within this fold lies the *pancreas*, moulded to the intestine on each side, and quite filling the interspaces of its curved surfaces. It is, therefore, about 3 inches in length, constricted along its central axis, and spreading out along both its ventral and dorsal surfaces. The anterior end is the larger, opposite to which the hepatic and gall ducts empty into the duodenum at least 6 inches from the gizzard. The pancreatic duct was lost in dissection, at a point about half an inch beyond the entrance of the hepatic duct, so that the point at which it empties into duodenum was not accurately determined, but it is certainly below the termination of hepatic duct. The intestine of this alcoholic specimen measures 44 inches in all; that of a fresh specimen, measured in the field, being 48 inches in length.* The cæca, which are quite as large in diameter as the intestine itself, are each 8 inches long, terminating in a mammillar point. From the origin of cæca to anus the distance is 3 inches; 23 inches below gizzard is another small cæcal appendage, rather less than 1 inch long.

Pericardium is large and full, occupying the central parts of thorax. A process of the pericardium is produced downward upon and between the lobes of the liver. The *heart* is large, and of the usual color. On each side of the trachea are to be seen the superior cavæ, with their branches, and beneath these lie the carotid arteries, which are double, the left being rather larger than the right. They dip beneath the trachea and œsophagus, converge, lying upon the anterior cervical muscles, run parallel for about half an inch, and divide into branches about an inch and a half above the first rib. The specimen not being injected, we were unable to determine whether or no there is an anastomosis between these arteries. The bifurcation of the trachea appears above the sternum, presenting no sternal fold in this species.

The liver is very large, extending on both sides for half an inch beyond the level of the acetabula. Left lobe nearly as large as right. Posteriorly and superiorly, it is deeply grooved by contact with the other viscera; anteriorly, a long-tailed process passes forward and upward, ending in a sort of suspensory ligament; the process of pericardium

* Mr. Cunningham records the length of the intestine of the larger species, *C. alba*, as but 40 inches, the cæca as 7 inches each; distance between their origin and the anus, 2¼ inches. (Journ. Anat. and Phys. 1869, p. 89.)

ve mentioned being, in fact, though not homologically, the principal pender of the liver. The posterior margin of the right lobe presents deep incisions, separating three pointed processes of liver tissue. left lobe is sharply unciform, the concavity of the hook looking ard. A decided thickening of the isthmus, on the superior surface he liver, indicates the third lobe. Gall-bladder distinct, empty; ary ducts very large.

he left ovary was found to have been quite active, resembling a ch of grapes. We counted twenty-six vesicles as large as No. 6 shot, en of these being as large as No. 3, besides very many large enough e distinct.

viduct tortuous; much enlarged; longitudinal plicæ very distinct laminated, like the leaves of a book. The sex of this specimen, ch had black wing-spurs, proves that that feature is not distinctive ale birds, as we had supposed.*

idneys are large, 1.95 inch; moulded on their superior (dorsal) surface it the irregularities of the sacrum. Near the termination of the er, in the cloaca, are noticeable two small glandular bodies.

alate is wide posteriorly, bounded at the sides and anteriorly by the jecting edges of the bill. Half an inch from the tip of beak, in the lian line, is a minute longitudinal crest; 0.10 inch behind this a ided tooth-like, bony process, directed backward; 0.20 inch posterior his are six tooth-like villi, directed backward and arranged, like a comb, a horizontal row. Here the lateral palatal ridges become prominent. rking the anterior end of the aperture of the posterior nares, and 0 inch behind the last-named process, are two longer tooth-like villi; each side of this slit, in the sulcus between central and lateral palatal ges, are six minute separate villi in a longitudinal row. Behind the for the Eustachian tube there is a transverse comb-like row of villi each side, directed backward and limiting the upper and back part the pharynx.

SKELETON.

SKULL.—On examination of the skull as a whole, the brain cavity pears relatively very large and high. The frontal region is much lated, and the whole arch very convex. The attachments for muscles generally not well marked, and the depression (crotophyte) for the sertion of the temporal muscle is almost obsolete.† Prominent points

* Bull. No. 2, Nat. Mus. 1875, p. 1.

† These observations are very different from those of Mr. T. C. Eyton on the skull of *onis alba*. He found the "cranium with a very small cavity for the brain; occipital

are: two deep fossæ just above and parallel to the superior orbital margins, a prominent bony crest (for the support of the caruncle) in front of these, the large size and subcircular form of the foramen magnum—all of which will be described in detail below.

Occipital bone is convex inferiorly and irregularly trapezoidal in shape. Its crest is less prominent than usual, although quite distinct; shaped like a bow, with its extremities distinctly defined as far as the superior border of the *meatus auditorius externus*. The condyle is small and spherical (not nicked, as in *Gallinæ*). *Foramen magnum* is nearly circular in outline, its anterior border being cut off so as to form a high, broad arch. It measures in antero-posterior diameter 0.21, in transverse diameter 0.32 inch. On each side of the condyle is a broad space for ligamentous attachments; laterally and posteriorly to these its paroccipital (?) portions extend downward as vaginal processes, protecting the posterior border of the external auditory meatus. From the foramen magnum to the crest extends upward a prominent median ridge, flanked by lesser ridges on each side from the lateral portions of the foramen.

Sphenoid is irregularly pyramidal in shape, being produced forward into a long cultrate spine (*basisphenoid*), embraced by the two prongs of the *vomer* and upon which ride the *palatine* and *pterygoid* bones. There are no distinct basipterygoid processes. Only the marginal portions of the basisphenoid contribute to the floor of the orbits, its orbital plates passing upward and outward to complete a septum between the brain and orbit. This septum is perforated in the median line by two irregular foramina for the transmission of the optic and olfactory nerves. The inferior (optic) foramen is heart-shaped, the apex of the figure being directed upward, and the lateral lobes much prolonged. The superior (olfactory) foramen presents the outline of the ace of clubs. As these are the chief anterior foramina of the brain-case, they probably transmit other nerves distributed to the orbit and face, as well as the olfactory and optic. Rising from the superior margin of the basi-sphenoid is the *inter-orbital septum*, perforated anteriorly in this species by an irregular vacuity, and posteriorly by an extension forward of the optic and olfactory foramina already noted. The interorbital septum is, however,

ridge very prominent; * * * * ridges for the attachment of the masseter muscles strongly marked." (*Osteologia Avium*, *London*, 1867, *p.* 176.) As we cannot believe there is any marked difference in the skulls of *C. alba* and *C. minor*, we simply fail to appreciate the pertinence of the author's remarks in this case.

properly speaking, incomplete only as regards the irregular foramen above mentioned. It is marked anteriorly by prominent stout bridges of bone, disposed so as to form the letter Y, which are continuous apparently with the notable exostosis marking the anterior portion of the frontal bone.

Parietal and *temporal* bones are not distinctly limited, owing to the complete ossification of the brain-case. The external auditory meatus is large, and so well protected by its surrounding periotic processes as to seem to be almost a tubular prolongation of the skull.

Os quadratum is in shape somewhat like a molar tooth, its crown being directed downward, and one fang (*i. e.* orbital process) projecting upward, forward, and inward nearly to the body of the basisphenoid. It presents five articulating facets; one inferior, broad, triangular, and marked by three marginal mammillæ, for the mandible; one external to and a little above this, for the zygoma; two, on its upper surface, for articulation with the temporal; and one, internal to these, for the pterygoid.

Pterygoids are relatively slender, 0.32 inch long, flattened from side to side, and slightly twisted upon themselves. They diverge from the palato-pterygoid articulation at an unusually wide angle, rather more than 90°.

Vomer is long, slender, bifid posteriorly, apparently extending from pterygo-palatine articulation to beyond the anterior extremity of the *maxillo-palatines*. Its complete anchylosis with the palatines, however, renders it impossible to determine exactly its posterior limit. Its superior surface is deeply channeled for its whole length. Beneath the vomer are to be found the *maxillo-palatines* and *palatines*, the latter soldered together on each side, but quite separated in the middle line.

Palatines are thin laminæ, irregularly concavo-convex. They present two prominent laminæ, external and internal. The external, which constitutes most of the bone, flares widely outward and downward, ending behind transversely, yet with a gently-rounded angle. From its under surface descends obliquely inward the much smaller internal lamina, like a keel.

Maxillo-palatines.—These bones are rather stout, squarish, tumid bodies, anteriorly joining the palatines at a point, but in all the rest of their extent entirely separated therefrom, as they also are from the vomer and from each other. The "body" is a very thin osseous wall, inclosing a hollow cavity. Anteriorly the *palatines* are produced as maxillary

processes to form the lateral borders of the palate and part of the osseous support of the basal portion of the bill.

From these accounts it appears that the palatal structure, as a whole, is what Huxley calls *schizognathous*.

Frontal bone is marked by two very distinct deep fossæ, occupying nearly the whole roof of the orbit, separated from one another by a prominent central ridge, and bounded anteriorly by a curious exostosis, which supports the fleshy caruncle of the forehead. The floor of this fossa is perforated by an anterior large circular foramen, transmitting the nasal duct of the gland which occupies the fossa. Behind this are several irregular perforations, disposed in a line parallel with the orbital margin. This last (the orbital margin) extends horizontally as a thin lamellar process, completing the roof of the orbit on each side. The remarkable exostosis above referred to may be described as consisting of two prominent bosses, one on each side, separated by a shallow central fossa, and presenting somewhat the outline of a bat with wings extended. From the external portion of each "wing" runs downward, parallel with the nasals, a slender bone (*maxilla*), articulated above by an expanded condyle, joining, below, the rest of the maxilla at the base of the bill. A narrow linear space is left between these bones and the nasal on each side. The construction of these parts is what Garrod calls *schizorhinal*.

Zygoma or malar bone is long (1.00 inch) and slender, of uniform diameter throughout, extending from the *os quadratum* to the base of the bill. It diverges rather widely from the middle line, the distance between its posterior attachments measuring 1.00 inch. *Lachrymals* are distinct, although small, easily detached, and liable to be overlooked. They are crooked little nibs of bone, with heeled base of support.

Mandible expands posteriorly into a flat articulating head, marked superiorly by a deep, irregularly concave glenoid cavity. On the internal side of this projects upward, and a little inward, a stout pyramidal process, slightly hooked toward its apex. Directly behind the articulation projects the *angle of the mandible*, a lamellar rostrum, nearly square in outline and very slightly canted upward; 0.15 inch in diameter. Externally there is a low pyramidal prominence, its apex filling the angle between zygoma and os quadratum, at their articulation. The body of the mandible is continued forward to the symphysis as a thin strip of bone, flattened from side to side, and sending upward a very thin lamella from its external surface to complete the contour of the bill. At

about the middle of the mandible, this lamella is incomplete, leaving a long, oval foramen, parallel to ramus, measuring 0.40 by 0.10 inch.

General measurements of skull.

	Inches.
Occipital crest to tip of bill	2.60
Occipital crest to fronto-maxillary articulation	1.40
Width of skull at base	1.00
Width between meatus auditorii	0.42
Extreme length of brain case	1.00
Extreme height of brain case	0.75
Width of frontal crest	0.80
Height of frontal crest, middle line	0.50
From fronto-maxillary articulation to tip of bill	1.40

The length of the symphysis is about one-fourth that of the entire mandible.

VERTEBRÆ.—*Cervical* are thirteen in number, differing considerably in shape. The second, third, and fourth show a distinct and prominent neural spine, which becomes very small on the fifth, and can scarcely be said to exist at all on the others. The second, third, fourth, ninth, tenth, eleventh, and twelfth present also very prominent laminar hypapophyses, which are not developed on the others. The bodies of the first four are very short, rapidly lengthening to the ninth, which is the longest, and again diminishing to the thirteenth, which is about as long as the fifth. All the cervical vertebræ but the atlas present large and distinct vertebral foramina, narrowing gradually toward the skull. The arteries which pass through these would seem to be of unusual size, since the bodies of the vertebræ are deeply grooved beneath for their reception. Rudimentary ribs are distinct on the last five cervical vertebræ, as uncinate processes directed downward and backward from the extremities of the transverse processes. They are less obvious farther up the neck.

Dorsal are eight in number, each carrying a rib, of which all but the first and last articulate also with sternum. Each rib articulates both with the body and transverse process of its vertebra, leaving a space between its tubercle and head, which completes a morphological continuation of the vertebral foramina. From the third to the eighth inclusive the dorsal vertebræ show very prominent lamellar neural spines, forming, by their apposition end to end, a continuous thin perpendicular ridge, which projects above the dorsum of the bird. The bodies of the fourth and fifth are much compressed and flattened from

side to side, making a semblance to a series of prominent lamellar hypapophyses along this part of the column. The transverse processes also of all except the first dorsal are very thin and broad, projecting as a series of flat tiles above the heads and tubercles of the ribs. The last dorsal lies between the crests of the ilia, beneath and abutting against which the rib which it bears comes out. The *sacro-lumbar* vertebræ, *i. e.*, those which are anchylosed with each other and which articulate with the pelvis, appear to be thirteen in number. Viewed from above, the broad, expanded portion of the sacrum (opposite the acetabula) shows six inter-trabecular spaces, the contour of the exposed surface being approximately diamond-shaped, about $\frac{3}{4}$ inch broad at the widest part by $1\frac{1}{8}$ inches in length. The median line above is flat, without indication of spinous processes. Viewed from below, the conjoined centra of the *sacro-lumbar* vertebræ are a narrowly fusiform mass, broadest about opposite the middle of the ilia. Inferiorly they are flattened and somewhat excavated, though anteriorly pinched together and deepening to join the articulation with the last dorsal vertebræ. The trabeculæ are longest and most distinct opposite the acetabula, two of them being especially prominent, while anteriorly four or five are conspicuous. Then follows an interspace of about the same length, in which they nearly disappear; nor are they strongly marked toward the posterior extremity of the column.

The *caudal*, *i. e.*, unanchylosed post-sacral vertebræ, are nine in number, considering the pygostyle as one. Pygostyle is simply laminar, with thickened under edge, irregularly quadrilateral in shape; long diameter, $\frac{1}{2}$ inch. Of the other vertebræ, the transverse processes of the intermediate ones are shorter than those of either extremity. Moderate neural spines, with no obvious hypapophyses except on penultimate vertebra. The whole series presents no special characters.*

* Comparison with De Blainville's vertebral formula will show several points to be considered.

In the first place, De Blainville is in expressed doubt as to the number of post-sacral vertebræ, and his formulæ, as given at p. 102 and at p. 106, differ with each other, the first being 15—6—14—7=42, the other being 15—6—14—8=43. Accounting for this discrepancy on the supposition of imperfection of his specimen, we throw the post-sacrals out of further consideration, and turn attention to the remaining elements of his formula, which are really less different from ours than appears at first sight, we giving 13—8—13, and he 15—6—14.

For we reckon the last costiferous vertebra as dorsal, he as sacral. This leaves the numeration of non-costiferous anchylosed lumbo-sacrals the same, namely, 13, in each case, adding one to his numeration of dorsals. We furthermore reckon as a dorsal

Sternum measures 2.40 inches by 1.20 at upper borders, and is therefore exactly twice as long as broad. (Others measure 2.5 by 1.3, No. 32♂; 2.42 by 1.20, No. 232.) The manubrial process projects slightly in front of anterior border, sending downward a small, thin beak-like process. Articulating surface for coracoid extends from external and posterior margin of manubrial process, nearly meeting its fellow above it backward and outward, to an angular prominence on the ridges limiting sterno-coracoid articulation .80 inch from the manubrial process. When the coracoid has been removed, the anterior margin of sternum is nearly transverse, showing only a shallow curve upon each side. The costal process projects laterally beyond lateral margins of sternum 0.22 inch, and behind coracoid articulation. There thus presents on each side a triangular space, defined in front by the ridge limiting sterno-coracoid articulation, its base occupied by a grooved facet for coracoid, and its two other sides constituted by the horizontal and lateral margins of the costal process.

The ridge limiting sterno-coracoid articulation inferiorly is prominent and sinuous—bow-shaped. It extends nearly to lateral margin of sternum, which is a thickened ridge, bearing facets for the articulations of ribs on its flattened wide edge, and passing upward to join costal process at nearly a right angle. Costal process is flat and obtusely pyramidal in shape. It projects upward and outward, and covers the posterior aspect of sterno-coracoid articulation. Body is slightly constricted at its middle part, where it measures 1.00, expanding again posteriorly to measure 1.40 inches from apex to apex of its external laminæ. Posterior border is convex, the xiphoid process being cut off transversely. The posterior border is deeply incised on each side by two notches, of which the inner measures .40 and the outer .45 in depth, measuring from the curved margin indicated by the extremities of the intervening strips of bone (hyposternal elements of Owen). The outer notch is thus *a little deeper* than the inner, yet, owing to the convexity of the posterior borders of the lateral parts of the sternum, the two laminæ limiting the notches are almost exactly of equal length. The margins of the lateral sternal elements are thickened, as already stated, becoming stoutest in the area

that vertebra which bears a distinct, though small and asternal, rib. Removing this disputed one from his cervical series, and adding it to the dorsal series, gives the eight dorsals we enumerate. The only discrepancy, in total numeration of cervical, dorsals, and sacro-lumbars, between his count (35) and ours (34) is one cervical. There being certainly but thirteen cervicals in our specimens, *C. alba* must possess one more cervical than *C. minor*, unless De Blainville miscounted.

occupied by the articulations of sternal ribs, about junction of anterior and middle thirds. Here the ridge is re-enforced by the thickened line, limiting externally the area of origin of pectoralis medius. At the posterior edge of costal process it bifurcates, becoming continuous on the one side with the ridge limiting coraco-sternal articulation, and with the external and posterior margin of the costal process on the other. The area occupied by the origin of pectoralis medius is the thinnest part of the bone. *Keel* begins strictly at apex of manubrial process, whence a sort of beak is given off, its margin looking downward and backward for 0.30 inch. Then follows a sharp angle, with a quite deeply excavated curve, backward, downward, and forward again, to the most prominent part of the rostrum. The anterior border of the keel is therefore quite deeply concave, and its anterior extremity pointed. Its inferior border is slightly convex, and runs backward and upward, bifurcating at its extremity to join the angles of the expanded gladiolus. It measures along its curve 2.1, and at its deepest part, opposite the anterior angle, 0.80 inch. Its anterior border is much thickened by a stout ridge, proceeding backward and downward from the internal angle of sterno-coracoid articulation.

Coracoid measures 1.30 inches in length, and consists of a subcylindrical shaft and two expanded extremities, bearing three articulating facets. The scapular extremity is produced upward and forward, terminating in a prominent facet for the articulation of the clavicle. This articulating head arches over inward, so as to constitute, by aid of a coraco-scapular ligament, a considerable foramen continuous upon the coracoid with a deep groove which runs down upon its lower face, and is bounded by a ridge of bone internally. Three-tenths of an inch above and behind the anterior end of the coracoid is a broad articulating surface, extending entirely across the posterior face of the bone, for the scapula. At the external junction of scapula and coracoid is the glenoid cavity. The shaft of coracoid is inferiorly convex, superiorly flat, and toward its posterior end slightly concave. It sends off a remarkable sickle-shaped spine from the outer side of its posterior head, which curves slightly upward and extends just to the extremity of the costal process of sternum. Internally to this, on its posterior margin, is a triangular spine, extending backward, which fits into a corresponding depression in the ridge limiting sterno-coracoid articulation. From this spine the articulating facet extends inward, arching upward at the same time, [illegible] from without inward. Including the external spine [illegible] bone measures .63 across its base.

Scapula is long and sword-shaped. It is flattened from before backward near its articulation, and from side to side from its midde third outward, being slightly twisted upon itself. It articulates with the coracoid by a broad oblique head, marked posteriorly by three prominences, and measures 2.10 inches in length by an average width of 0.15 inch.

Furculum is moderately stout, U instead of V shaped, its sides at first parallel, then curving gently toward each other. It runs backward, with little downward inclination, and its apex is directly beneath the *manubrium sterni*, falling far short of the apex of the sternal keel. There is no prominent process at the union of its two elements, only a small mass of bone, facing the manubrium.

Ribs are eight in number, of which all but the first and last articulate with sternum. Splint ribs are distinct, averaging 0.40 inch in length, slightly curved, pointed, and directed obliquely upward and backward; but we cannot say how many there are, owing to the carelessness of the person who boiled the subject.

Humerus measures 2.70 inches in length; a slender bone, slightly curved, like an italic *f*. Its head is much expanded and flattened from without inward, covering the region of the joint as with a shield, convex externally, concave internally. It is marked by many deep grooves and depressions for muscular attachments, and by a very prominent ridge along its dorsal surface, whereto are attached the tendons of the pectoralis major and minor, latissimus dorsi, and scapular muscles.

The forearm is slightly longer than the humerus, measuring 2.9 inches from elbow to wrist. The *radius* measures 2.70 inches, and the ulna 2.80 inches. Both bones are rather stout for their length. Just below the carpal joint is given off from the radial side of the carpus a prominent exostosis, knob-shaped, 0.30 inch long by 0.20 inch wide at the base, growing out perpendicularly to the axis of the bone. This knob supports the wing-spur, is undoubtedly bony, but presents no recognizable evidence of independent ossification. The principal bone of the metacarpus, that representing the middle finger, carries two phalanges, measuring together 1.20 inches. To its ulnar side is attached at each end the metacarpal bone of the fourth finger, which acts as a splint-bone, being quite separate excepting at its extremities. This fourth metacarpal carries but a single phalanx. The radial metacarpal is a small spicule.

Femur measures 2.1 inches in length. Trochanter is flattened so as

to protect the joint externally, and rises above the margin of acetabulum.

Tibia is much longer than femur, 3.30 inches. Its head is much expanded, with a very prominent anterior flattened process, triangular in shape and curved slightly outward.

Fibula is distinct above; united to tibia by a thin, bony bridge along the middle part of its course; becoming free again as a very slender rod, which is finally fused with tibia at about its center, and quite lost an inch above its tarsal extremity.

Tarso-metatarsus terminates in three double condyloid facets, claw-like, partly separated. The outermost is shortest (highest), the middle longest, and the innermost one intermediate in length. About one-tenth of an inch above the junction of the middle and innermost elements is a foramen quite through the bone from before backward, and about large enough to admit an ordinary pin. From the head to the end of the middle division of its lower part the bone measures 1.75 inches, to the inner division, 1.65, and to the outer, 1.50, inches.

Toes are four in number. The first toe, articulated to the metatarsus above the level of the rest, has two elements. Its accessory metatarsal is very short. The second toe, articulating with the inner condyle, has three elements, successively diminishing in length. The third toe has four elements, similarly diminishing; and the fourth toe has five, of which the first is longest, the second and fourth next and equal, the third next, and the fifth shortest.

Pelvis is long, compressed anteriorly in the middle line of its dorsal surface, expanded posteriorly, and diverging so as to include the sacrum. The crests of the ilia extend so far forward as to cover the articulation of the last rib, and are separated in the middle line only by the lumbar neurapophyses, to which they are closely apposed, being turned up to form a sheath. Eight-tenths of an inch from the anterior margin of the pelvis the ilia begin to diverge, inclosing a hastate interval, which is filled up by the sacrum. Here the dorsal surface of the ilia becomes convex (from concave), presenting a well-defined, smooth surface for the origin of the gluteal muscles. Posteriorly, the ilium ends in a sinuate border limited externally by a prominent ridge, which terminates posteriorly in a considerable spine, the tuberosity of the ischium. The *acetabulum* is perforate, protected posteriorly and superiorly by a prominent bony lip, which separates it from the ischiatic foramen. Between the ischiatic foramen and the acetabulum, and inferior to both, is the obtu-

space, limited below by the pubis and above by the ischium. It is converted during life into an oval foramen by a stout ischio-pubic ligament. The ramus of the ischium runs downward and backward as a long falcate process, flat, thin, and curved on the flat somewhat inward. The *pubis* is long, very slender, shaped like an italic *f*, and crosses the ischium externally to its ramus, extending 0.40 beyond it, curving inward as it passes backward. Both ischium and pubis extend considerably beyond the coccyx posteriorly, and approximate each other, inclosing, with ilium, an irregular, circular outlet, of which the sacro-pubic diameter is 1.30 and the inter-ischiatic 1.10 inches. Internally the ilia are deeply excavated opposite the sacrum for the kidneys, so that the acetabular and ischiatic foramina pass out *laterally* from the cavity so formed. Its roof is crossed by the sacral trabeculæ, and encroached upon by the sacrum, somewhat like the ridge-pole and lateral ties of the roof of a house. This iliac cavity is limited anteriorly by the margin of a ridge formed by the fusion of the ischium and pubes. Posteriorly, although the rami of the ischium do not articulate or fuse together, they *touch*, doubtless closing during life the whole obturator space, here very long and narrow.

STATEMENT OF CONCLUSIONS DEDUCED FROM THE FOREGOING.

HABITS, GENERAL APPEARANCE IN LIFE, AND EXTERNAL CHARACTERS.

The observer is first struck by the strong resemblance which *Chionis* bears to the pigeons, in general appearance, gait, and mode of flight. The general shape of the body is of an ordinary columbine character, the head being notably small, as usual in that group, the neck short and full, and the body plump; the tail, moreover, having but 12 rectrices. The sheath of the bill may furnish a distant analogy with the soft, swollen membrane which covers the nostrils throughout the *Columbæ*. But this is a mere resemblance, the affinity indicated being, as will be seen later, with such sheaths as the *Procellariidæ* and especially *Lestridinæ* bear. The strongly convex outline of the frontal feathers at the base of the upper mandible is a very decided columbine feature. These superficial resemblances to *Columbæ* are not correlated with more important structural characters, and are themselves overbalanced by other external features, which indicate relationship with other groups. Thus the pterylosis is entirely different, large after-shafts and abundant down

being present. The pterylosis stops above the suffrago; the inner remiges reach to the ends of the primaries in the folded wing. As to the exterior portions of the body not covered with feathers, the feet are entirely different from those of the pigeons, in the shortness and elevation of the hallux and other features, while the bill, aside from the sheathed portion, is altogether diverse. The reference of this form, therefore, to, or even near, the *Columbæ* is out of the question.

The only external character indicating a *passerine* affinity is the form and size of the beak, which are decidedly corvine; an analogy which, however, is as feeble as that deduced from the croaking note of the bird when on its feet, and has, of course, no taxonomic significance.

The external resemblances to the *Gallinæ* are much more obvious and important. The contour-feathers have large after-shafts—at least half as long as the main shafts. There is a curious gallinaceous trait exhibited in the mode of holding the wings during life—drooping and parallel with the tail instead of meeting each other above it. The frontal caruncular casque presents an obvious resemblance to the combs which ornament so many of the typical *Gallinæ*. The few tail feathers and contour of those of the forehead are, however, columbine rather than gallinaceous, while the elongation of the inner remiges and general shape of the wing is rather grallatorial. The feet, in almost every particular, are thoroughly gallinaceous, even to the character of the marginal fringe of the toes, which retains strong pectinations instead of presenting the smooth border characterizing the feet of many of the *Grallatores*. The points in which the feet differ from those of most *Gallinæ* are: The reticulation instead of the anterior scutellation of the tarsus, and nakedness of the lower portion of the tibiæ; both these features being essentially grallatorial, though shared by the gulls. As to other naked portions of the body: The presence of the wing-spur indicates affinities lower than the *Gallinæ* so far as it has any taxonomic value, such spurs being a rare accident of higher (*i. e.*, more recent) birds, and its development being most pronounced in older, more generalized types—struthious birds, for instance. The abundance of gray down is an indication of relationship with pelagic birds, and by so far removes the bird from the neighborhood of *Gallinæ*. The legs are altogether below the average grallatorial length, and the small extent (one-half inch) of the unfeathered part of the tibia seems to assimilate it, as De Blainville has observed, with the gulls. The system of coloration also is extremely gull-like. The bird, in fact, closely resembles super-

ficially *Pagophila eburnea*, or *Pagodroma nivea*. The thoroughly anomalous bill offers nothing of interest in this connection. On the other hand, the bird's omnivorous diet, habits under confinement, easy domestication, dislike of water, entire inability to swim, and many other points in its habits, are strongly gallinaceous characteristics, by so much removing it from the vicinity of either grallatorial or natatorial birds.

Proceeding to consider the relationships of *Chionis* with *Grallæ* as to external features, the following points present themselves: A small, flat, twelve-feathered tail, a wing with the inner remiges equaling the longest primaries, a tibia bare below, a completely reticulate tarsus. These are all grallatorial features. As to other indications to be afforded by external characters alone, we should not omit to refer to a struthious feature already noted by W. K. Parker (Trans. Zool. Soc., vol. v, p. 207) in the following terms: "There are certain curious, thoroughly *marine* plovers (*Chionis*), in which the sheathing of the upper jaw is very perfect. They thus retain a struthious character, but in an exaggerated condition."

Upon one point which we consider important, the required data are wanting. We refer to the nature of the bird, whether altricial or præcocial. The now well-known egg itself has been perhaps hastily considered to be decidedly pluvialine; yet, for all we can see, it is quite as thoroughly larine. Now, as we shall see beyond, the relationships of the bird are nearly balanced between the plover-snipe and the gull-petrel groups. If *Chionis* lays regularly four eggs, and if the young run about at birth, this would be a great argument for De Blainville; if it lays two or three eggs, and rears its young in the nest, the boot would be on the other leg.

In summing external characters, therefore, we see how exactly *Chionis* stands between grallatorial and natatorial birds, retaining slight but perfectly distinct traces of several other types of structure.

Inasmuch as M. de Blainville is the only naturalist who has made any careful study of this genus (based upon specimens of C. *alba*), and as his conclusion that its nearest affinities are with *Hæmatopus* have never been formally disputed, it seems proper to consider here the external features upon which this distinguished naturalist based his deductions.

In the first place, De Blainville labored under the disadvantage of never having seen a specimen of *C. minor* (it had, indeed, not been dif-

ferentiated at the time of his description) which we regard as clearly the type species of the family. Secondly, the description of the living bird to which he had access related only to individuals observed under the unnatural conditions of confinement on shipboard, which may account for the discrepancies between his and our descriptions of its habits, and tends to invalidate the conclusions which he draws therefrom. While he has stated fairly and accurately many of the resemblances to *Hæmatopus*, or in other words to *Grallatores*, he seems to us to have failed to give due weight to the many important points of difference from that family, some of which we have already discussed, and others of which will appear in a stronger light as we proceed to examine the internal structure.

MUSCULAR AND DIGESTIVE SYSTEMS.

The muscular system affords less important and decisive indications than either the digestive or osseous. According to our dissections, the general disposition of the pectoral muscles which act upon the humerus is, as would have been anticipated from the mode of flight, rather gallinaceous than grallatorial. This statement is borne out by the relative development of the several pectorals, the bulk and extensive origin of a "*coraco-brachialis*" (see page 94), and a specialization of a sort of *platysma myoides* with reference to its action upon a large crop. A tolerably minute description of the more important muscles has been given on a preceding page as material for further comparisons than we are at present prepared to undertake.

In the *digestive* system we meet at the outset with several gallinaceous characters. The breadth of the mouth, especially near the base of the bill, shape of the tongue, and general disposition of the several palatal and lingual appendices, are rather those of a gallinaceous than of a grallatorial bird. In the shore-birds, among which *Hæmatopus* falls, narrowness of the bill and constriction of the whole buccal cavity is a very distinctive feature. The slender œsophagus of *Chionis*, much narrower than is usual in shell-eating birds, presents the extremely rasorial feature of a large and circumscribed crop. The proventriculus is not a marked dilatation of the œsophagus. Its solvent glands differ widely from those of the *Gallinæ* in their simple structure, approaching, in this respect, to those of various water birds, such as the swan and gannet. But the low taxonomic value of this feature is illustrated by the marked differences exhibited by those of so nearly related birds as the swan and goose, for example. No greater value attaches to the disposition

of the zone of glands as a whole, since it varies widely in closely-allied genera.

The gizzard appears to be unique, so far as we know, in the antero-posterior, instead of lateral disposition of its masses of muscle. The development of muscle is intermediate between the great masses found in the *Rasores* (and such *Natatores* as the goose) and the less considerable layers found in *Grallatores*, but altogether different from the thin membranous bags of fish-eating birds like gulls. The length of the intestine (about three times that of the bird), and its calibre, do not differ greatly from the same characteristics in *Rasores*. The cæca are very long, and dilated toward their blind ends; in this respect totally unlike the grallatorial type, in which the cæca, when present, are commonly small and simple.

The third cæcum, of uncertain significance, is distinct, although small. This appendage is found in various grallatorial, some struthious, and many other birds. On the whole, it is safe to say that the digestive canal is decidedly rasorial in character.

OSSEOUS SYSTEM.

From a decided position among *Gallinæ*, on the other hand, certain parts of the skeleton exclude this bird as effectually as the existence of a sternal keel renders the consideration of struthious affinities unnecessary in this connection. The sternum departs furthest from that of a struthious bird, and next most widely from the very peculiar rasorial form. The most cursory inspection throws out at once the deeply-cleft, strongly specialized sternum of gallinaceous birds. It is of a very simple generalized type, presenting characteristics to be found in widely diverse groups of birds, but on the whole resembles most closely the commonest form of the sternum of the *Laridæ*, with a marked likeness also to the breast-bone of a plover. The obvious resemblance of this bone to that of *Hæmatopus* is the central point of De Blainville's argument. Yet we are inclined to believe that the sternal characters upon which De Blainville most relies as distinctively pluvialine are simply the most generalized features of the bone—those which, under various modifications, are to be found in the greatest number of different groups. And simple comparison shows beyond dispute a greater resemblance of this sternum to that of the gulls than to that of wading birds.

The general form, the existence of a prominent manubrial process, and extent of the costal margins, the great prolongation of

the costal processes, the development of the keel relative to the size of the body of the bone, the general disposition of the coraco-sternal articulation, and the doubly-notched posterior border, are all thoroughly gull-like. The point of difference of this sternum from that of the gulls, is a moderate rounding of its posterior margin, so that the outer of the two spurs of bone does not reach so far back as the inner; the reverse being the case in *Laridæ*. Such form of the posterior margin is a common grallatorial character; nevertheless, in *Limosa*, for instance, this border is perfectly transverse. Moreover, the difference between *Chionis* and *Larus* in this respect is less than the difference between *Larus* and its near neighbor *Lestris*. In the wading birds the manubrium is either absent or quite small, the keel is very deep in proportion to the extent of the body, and the body is compressed anteriorly, and very deeply hollowed. As to all of these features, the sternum of *Chionis* differs from that of the plovers and approaches that of the gulls. In comparison with either plovers or gulls, there is a feature peculiar to *Chionis* in the relation borne by the furculum to the sternum. For both gulls and plovers have a strongly bent furculum with a well developed posterior spine reaching nearly to the apex of the sternal keel; whereas, in *Chionis* the furculum is scarcely bent, has no spine whatever, and its apex is closer to the manubrium than to the sternal keel. In place of a posterior spine there is a slight process of bone directly facing the manubrium.

The clue to the true affinity of the bird furnished by these gull-like sternal characters, is traceable in every part of the skeleton.

To begin with the skull. The *Gallinæ* may be at once thrown out of the discussion by the absence in *Chionis* of the following, among other distinctively "*alectoromorphic*" features.* The occipital condyle is simple, not notched; there are no basipterygoid facets, the pterygoids articulating with the basisphenoid only at their extremities; the internal lamellæ of the palatine bone are strongly developed instead of rudimentary; and the shape of the palatines, as a whole, is radically different. The maxillo-palatines are long and spongy, instead of being lamellar. Vomer is large, conspicuous, and completely anchylosed with the palatines. The articulation of the quadrate bone with the temporal is very different, nor is there in front of this bone the immense fenestrated process so conspicuous in *Gallinæ*. The angle of the mandible is not strongly upcurved. There are great pits on top of the skull for the

* Huxley on Classification, P. Z. S. 1867, p. 459.

lodgment of the nasal glands not seen in *Gallinæ*. In fact, the curious frontal bosses found on some cocks are one of the most obvious points of resemblance, aside from the fact that the palates of both are *schizognathous*; but a fortuitous exostosis like this has, of course, no classificatory significance.

On the other hand, every important feature of the skull is identical with the characters presented by the skull of the gulls. So perfect is the resemblance that after careful comparison the principal discrepancy between the two skulls that we are able to detect is the wider divergence of the pterygoids from each other, and the consequently more posterior position of the palato-pterygoid articulation in the skull of *Chionis*. The most trifling details of the gull's skull are repeated in that of *Chionis*. It is needless to enumerate them. There is, however, a character of uncertain value in the front of the gull's orbit, where a strong transverse plate of bone projects, bounding the orbit anteriorly; no such formation being found in *Chionis*, wading, or gallinaceous birds. As to the angle of the mandible, it is found to be in *Chionis* essentially as in the gulls, yet with a slight production posteriorly, much like that found in some wading birds. In general, the slight differences observed between the details of the skulls of *Chionis* and gulls are differences of degree only; a less development of bony ridges and processes, a greater relative breadth, and less forcible expression of differential details. The difference in the form of the rostrum, which is likely to attract attention, is of no significance whatever, since extraordinary differences in this respect are found among the *Laridæ* themselves (*cf. Rhynchops, e. g*).

Nitzsch first, from consideration of the pterylosis alone, and Huxley subsequently, with reference to the skeleton, have demonstrated a very close, although not generally recognized, connection between the great plover-snipe group and the gulls; and in discussing the affinity of *Chionis* to the gulls, we might be supposed to imply nearly or quite as intimate relationship with the plovers. But in *Chionis* we miss precisely those characters which are relied upon to distinguish the plovers from the gulls, namely, an extensive naked space above the suffrago as regards pterylosis, and the presence of distinct basi-pterygoid processes as regards osteology. Furthermore, plovers do not possess the great pits on top of the skull which are so conspicuous in *Laridæ* and in *Chionis*, their rostrum is slender and elongate, their maxillo-palatines are never swollen or spongy (as in *Chionis*), and the angles of their mandibles are produced into slender recurved processes.

Throughout the skeleton, minute and careful comparison, bone by bone, shows only close similarity between *Chionis* and the gulls, as great as that already signalized in treating of the skull In short, had we only the skeleton of *Chionis* to go upon, we should be obliged to place the genus in *Laridæ;* its peculiarities being less widely diverse from those characterizing that family than are to be found within the limits of the family itself.

We thus find in *Chionis* a connecting link, closing the narrow gap between the plovers and gulls of the present day. In our opinion, this group represents the survivors of an ancestral type from which both gulls and plovers have descended. And this opinion is strongly supported by the geographical isolation of its habitat, affording but few conditions favorable to variation.*

In the practical matter of classification, it is evident that *Chionis* is not exactly referable to either of the two groups between which it stands. A consideration of its external characteristics, its digestive system, or its osteology, solely, would lead to very widely diverse conclusions. For we have presented in this bird a genus with the general appearance, gait, and flight of a pigeon, with the beak and voice of a crow; with the habits of a wader, yet dreading the water, and with the pugnacity and familiarity with man of a rasorial bird. With the last group its digestive system would certainly place it, to say nothing of the long after-shafts of the feathers. And osteological comparison establishes its position definitely between the gulls and plovers, but rather nearer to the former.

* It is interesting to note in this connection that the fauna of Kerguelen Island is rather remarkable as containing several forms of animal life whose structure would give no clue whatever to their habits, so aberrant has been the progress of their variation in the peculiar conditions under which they live. Thus the great southern skua (*Buphagus skua antarcticus*, Bull. No. 2 Nat. Mus., p. 11) has there adopted the habits of a land-hawk; three very remarkable genera of apterous *Diptera* occupy the place and live the life of leaf-eating and carnivorous beetles; and the only beetles found by Dr. Kidder were curculios (in a country without trees or shrubs), and a small water-beetle (*Oothebius*), living at a distance from any body of fresh water. The curculios lived upon the rocks and moss, and had lost their northern habit of simulating death, while one genus of apterous *Diptera* had taken up the habit, and lived upon the leaves of the largest plants there represented. Several orders of insects, including *Hymenoptera, Hemiptera, Orthoptera,* and *Neuroptera,* among the commonest elsewhere, are here entirely absent; so that those which are represented are placed among altogether anomalous surroundings. As Latreille has said (Hist. Nat., vol. xi, p. 51), "*La nature en général a un certain nombre de modèles qu'elle reproduit avec des modifications dans tous la classes, et même dans les ordres.*"

Such distinctive characteristics, amounting almost to anomalies, certainly appear to us to be of a super-family value; equivalent in taxonomic importance to those upon which the groups which Professor Huxley has characterized by the termination "*-morphæ*" are founded. Much of the discussion which *Chionis* has occasioned has grown out of the tacit assumption that it was merely a genus or family, which *must go somewhere* in a pre-established system; the fact being simply, that it is a member of no recognized group, and must consequently alone constitute one of super-family grade.

Such a group, therefore, we propose to establish, upon the following combination of characters:

CHIONOMORPHÆ.

Palate schizognathous; no basipterygoid facets; divergence of the pterygoids greater than 90°; *maxillo-palatines inflated or spongy, not laminar; angle of mandible not hooked; nasals schizorhinal; marked supraorbital fossæ.*

Furculum without a spine; its apex nearer manubrium sterni than the point of the keel; a small bony process over its symphysis, facing manubrium. Osseous system thoroughly Larine.

A definitely circumscribed crop; a strongly muscular gizzard, the muscular masses being antero-posterior instead of lateral; very long cæcal appendages. Digestive system generally resembling that of the Gallinæ.

Contour-feathers with well-developed after-shafts; abundant gray down-feathers; tibiæ naked below; rectrices 12; *inner remiges equaling the longest primaries; outline of frontal feathers convex.*

Beak corvine, peculiarly sheathed.

Feet not palmate; digits, 4; *hallux short and elevated.*

There being but a single family and genus recognized in this group, it is difficult, if not impossible, to distinguish those characters which are of family value from those which may prove to be only generic. Indeed, it is rather upon the extraordinary combination here presented, of very diverse characters, than upon the importance attaching to those of any single "system" of the birds' anatomy that we base the suborder hereby proposed. We regard the Chionomorphs as constituting exactly the heretofore unrecognized link between the Charadriomorphs and Cecomorphs, nearer the latter than the former, and still nearer the common ancestral stock of both.

Mr. A. R. Wallace (Remar aracters in

the classification of birds) "will not allow that the osteological characters are an all-sufficient guide (in classification), believing that the whole structure of a bird and its corresponding habits may be profoundly modified, while its sternum may closely resemble a common form, and *vice versa*." (See Ibis, 1864, pp. 36–41.) *Chionis* is a forcible illustration of this sound remark.

It seems worth while to note a generic distinction probably existing between *Chionis alba* and the so-called *C. minor*. We have not had the opportunity of examining the former, and must judge solely by the descriptions thereof which have been published. According to De Blainville there is even a difference in the number of the cervical vertebræ. He describes *C. alba* as possessing one more cervical vertebra than we find in *C. minor*. No descriptions allude to the extension of the caruncular casque entirely across the forehead in either species. The various descriptions of *C. alba* indicate a very different arrangement of the caruncular folds about the eye; the sheath of the bill in *C. alba* is flat and closely apposed to the upper mandible, as in *Lestris*, while in *C. minor* it is canted upward anteriorly and tubular, almost as in the petrels.

These characteristics, among others, seem to us to be supra-specific; and in view of the fact that we consider *Chionis minor* to be undoubtedly nearest to the ancestral type, we propose to call it *Chionarchus*. Its name would then be in strictness *Chionarchus minor* (Hartl.).

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BULLETIN

OF THE

UNITED STATES NATIONAL MUSEUM.

NO. 4.—BIRDS OF SOUTHWESTERN MEXICO COLLECTED BY FRANCIS E. SUMICHRAST.

PREPARED BY

GEORGE N. LAWRENCE.

PUBLISHED UNDER THE DIRECTION OF THE SMITHSONIAN INSTITUTION.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1876.

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ADVERTISEMENT.

This work is the fourth of a series of papers intended to illustrate the collections of Natural History and Ethnology belonging to the United States, and constituting the National Museum, of which the Smithsonian Institution was placed in charge by the act of Congress of August 10, 1846.

It has been prepared at the request of the Institution, and printed by authority of the honorable Secretary of the Interior.

JOSEPH HENRY,
Secretary Smithsonian Institution.

SMITHSONIAN INSTITUTION,
Washington, February, 1876.

BIRDS

OF

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1875.

CATALOGUE OF BIRDS COLLECTED BY PROF. FRANCIS SUMICHRAST, IN SOUTHWESTERN MEXICO, AND NOW IN THE NATIONAL MUSEUM AT WASHINGTON, D. C.

By George N. Lawrence.

A few years since, an arrangement was made by Prof. Joseph Henry, Secretary of the Smithsonian Institution, with Prof. Francis Sumichrast, for an extended exploration of the Pacific side of the Isthmus of Tehuantepec, Southwestern Mexico, for the purpose of procuring specimens of its natural history

At the request of Professor Henry, I undertook the examination of the birds contained in these collections; and they have been forwarded to me from the Smithsonian Institution, from time to time, when received.

During the past four years, four instalments have been sent me, containing 321 species, represented by more that 1,700 specimens.

Circumstances occurred which prevented quite so full an exploration of the isthmus as was at first intended; however, the specimens sent (which are of a remarkably fine character) bear testimony to Professor Sumichrast's efficiency as an industrious and energetic collector, and the many valuable notes manifest his accuracy and intelligence as an observer.

In answer to a remark in one of my earlier letters to him, expressing my surprise that so few new species had been obtained, he says: "I am not astonished at the small number of new species that my first two collections contain. The region of the Pacific is comparatively much poorer than that of the Atlantic. This must be attributed to the extreme dryness of the soil; to the scarcity of vegetation and of insect life; and to the duration of the winds from the northeast and southwest, which there prevail with great violence."

Professor Sumichrast sent me some valuable notes on geographical distribution, which are given below.

He has sent also biographies of many species, which are in their proper places in the catalogue. Finding that these biographies did not

extend through all the families, I wrote him for an explanation, and got the following reply: "I regret to be unable to tell you certainly which are the biographies and notes that I forwarded to the Institution. Almost all my books and papers were carried off in 1871 during the pillage of my house in Juchitan, and I cannot verify the dates of my invoices to the Institution."

In December, 1871, Professor Sumichrast was obliged to leave Juchitan on account of the revolutionary state of the country, and made his residence at Santa Efigenia, which he writes me is "a *hacienda* thirty leagues or so south of Tehuantepec, at the foot of the Cerro de la Gineta, and on the border of the State of Chiapas." Tapana, a locality often given, he says is "a village in the neighborhood of Santa Efigenia."

All communications from him are designated by quotation-marks.

"NOTES ON THE GEOGRAPHICAL DIVISION OF THE BIRDS IN THE SITHMUS OF TEHUANTEPEC.

"The contraction of the American continent between the ninety-fourth and ninety-fifth degrees of longitude west from Greenwich forms what is called, quite improperly, perhaps, the Isthmus of Tehuantepec, whose width between the mouth of the Rio Coatzacoalcos and the Bay of Ventosa is about one hundred and eighty miles.

"In a physical point of view, the isthmus may be considered as divided into three parts, first, an eastern, extending from the Gulf of Mexico to the Puerta; secondly, a central, from the Puerta to the Chivela; and, thirdly, a western, from the Chivela to the Pacific. The eastern part, formed principally of alluvial land and watered by the Coatzacoalcos and its affluents, has its largest portion covered with thick and damp forests, whose vegetation rivals the greatest beauties of tropical nature. The central region presents an undulating surface, embossed with innumerable *lomas*, or hills, which, rising gradually, unite on the western side with the mountains of the Sierra de los Mijes, and, toward the east, with those of the Sierra de Chimalapa. Although watered by numerous streams, it presents, nevertheless, but a scanty vegetation, essentially characterized by oaks on the side of Sarabbia, and palm-trees on the plateau of Chinela. The western division, or plains of the Pacific, is very dry, and its vegetable physiognomy presents a striking contrast to the rich plains on the Atlantic slope. Of the few rivers which flow through it, the most important are the Tehuantepec, Juchitan, Chicapa, and the Ostula. These are so low during part of the dry season that the inhabitants of the villages and *ranchos* situated on their banks have

no drinking-water but that which they draw out of holes dug in the sand.

"From that it can be easily explained how the number of animal forms, as well as the vegetable, decreases perceptibly in proportion as you advance from the Atlantic to the Pacific.

"In a zoölogical point of view, the preceding division into three regions is modified in this sense, that the central part or mean does not present any distinguishing forms which can characterize it.

"A line drawn on the map through the villages of Santa Maria, Chimalapa, and San Juan Guichicovi would indicate quite correctly enough the boundary-lines between the two zoölogical provinces or regions which divide the isthmus, and almost that of a division of the waters which flow to the Atlantic and the Pacific. Several places situated on the crest of this line present, as might be expected, a mixture of forms belonging to each littoral; thus, in the neighborhood of Barrio, *Conurus aztec* and *petzi*, *Chrysotis autumnalis* and *albifrons*, *Psilorhinus morio*, and *Calocitta formosa*, &c., are found together.

"It is to be noticed that, while the species belonging to the western province seldom or never leave it to spread in the opposite direction, several of those in the eastern province advance, on the contrary, to within a short distance of the shores of the Pacific. To quote as examples: *Turdus grayi*, *Attila citreopygia*, *Muscivora mexicana*, *Rhynchocyclus cinereiceps*, *Oncostoma cinereigulare*, *Chiroxiphia linearis*, *Chrysotis levaillanti*, *Pteroglossus torquatus*, *Penelope purpurascens*, *Crax globicera*, *Tinamus sallæi*, &c.; all of them species whose place of development is without contradiction in the limits of the Atlantic region, but which are found in the immediate neighborhood of the Pacific, (Santa Efigenia).

"The difference in the level of the ground, which exerts elsewhere in Mexico such a great influence over the geographical distribution of animal species, only exists in a slight degree in the Isthmus of Tehuantepec; one of the culminating points of this territory, the Cerro de Mazahua, is not elevated probably more than from 500 to 2,800 feet above the level of the sea. We must not, therefore, expect to find in the isthmus properly so called any of the indigenous species which elsewhere characterize alpine regions. The few species of that region which are found in my collections have been gathered out of the isthmus; some in the Sierra of Oaxaca, others in the mountains of Gineta and of Zapotitlan.

"If, in order to establish a sort of two ornitho-

logical *horizons* of the isthmus, we seek what especially distinguishes the western province from that of the Gulf, we will find—

"I. That it is less remarkable for the number of forms that belong to it than for the absence of others which predominate in the eastern part, to which they give their own physiognomy, and, if I may so express it, one more essentially neotropical.

"II. That it presents, in relation to the preceding, a marked numerical inferiority in the following families: *Turdidæ*, *Tanagridæ*, *Fringillidæ*, *Momotidæ*, *Trogonidæ*, *Ramphastidæ*, *Picidæ*, *Columbidæ*, *Perdicidæ*, and *Tinamidæ*.

"III. That it is remarkable for the almost entire absence of the families *Dendrocolaptidæ*, *Formicaridæ*, and *Pipridæ*.

"Up to this time, I have only found two native species of Thrushes in the plains of the Pacific. The first, *Turdus flavirostris*, does not go southeast of the city of Tehuantepec, where it appears at distant intervals, at a period when certain fruits are ripe (*Achras*, *Spondias*, &c.) It is probable, as Professor Baird indicates (Review of North American Birds, p. 31), that its center of propagation is in the neighborhood of Colima. The second, *Mimus gracilis*, is very abundant on the dry plains which extend from Tehuantepec to Tonala. We can give an account, it appears to me, of the numerical inferiority of the *Turdidæ* in the west of the isthmus by considering that Thrushes in general are more especially attached to cold and mountainous countries, and, as it has been seen, the same characteristics do not exist in the isthmus properly so called. Besides, the plains of the Pacific have but a scanty vegetation, formed for the greatest part of leguminous plants, which birds whose natural diet is berries (as for example *Planesticus*) seek for but little. This latter circumstance explains also the absence of several genera of *Tanagridæ*, such as *Rhamphocelus*, *Phanicothraupis*, *Lanio*, &c.

"*Trogon citreolus* is the most common Trogon in the west of the isthmus. It is less sylvicoline than its congeners; and the yellow color of its iris is not found, to my knowledge, in any other Trogon of Mexico.

"*Ramphastos carinatus* belongs to the eastern part of the isthmus, in the *terres chaudes*. *Aulacorhamphus prasinus* is not found, from what I am called upon to believe, in the isthmus proper, but only in the mountainous and temperate parts, which border it on the northwest and southeast. As to *Pteroglossus torquatus*, I have not found it elsewhere than at Santa Eugenia.

"*Momotus mexicanus* is the only species of the family that is resident

in the province of the Pacific. *M. lessoni* and *Eumomota superciliaris* occasionally appear; but they are considered to be wanderers from the province of the Gulf, where *Hylomanes momotula* also occurs.

"The resident species of *Picidæ*, on the plains of the Pacific, are *Campephilus guatemalensis*, *Dryotomus scapularis*, and *Centurus aurifrons*.

"The genera *Geotrygon*, *Lepidænas*, and *Talpacotia*, of the eastern coast, are not found on the western shore of the isthmus.

"A species of *Ortyx* (*O. coyolcos*) represents the family of the *Perdicidæ* on the plains of the Pacific, which, in the eastern province, on the contrary numbers several representatives.

"The specimen of *Tinamus sallæi* in my collection comes from Santa Efigenia, a spot which may be considered as extra-isthmique.

"Notwithstanding my assiduous researches, I have been unable to meet with but a single representative of *Dendrocolaptidæ*, *Dendrornis eburneirostris*.

"*Chiroxiphia linearis* in my collection comes from Santa Efigenia.

"In exchange for the numerical inferiority in regard to the above-mentioned families, we observe a greater development in those of the *Sylviidæ*, and perhaps also of the *Tyrannidæ*, particularly the genera *Polioptila* and *Myiarchus*. The eastern coast of Mexico has furnished, up to this time, but a single species of *Polioptila* (*P. cærulea*), and, moreover, it probably only resides there in winter; on that of the Pacific we find, besides the preceding, two species with a black head, *P. nigriceps* and *P. albiloris*, both indigenous. *Myiarchus lawrencii* is the only species of the genus which can be called common on the coast of the Gulf of Mexico. On the opposite shore, the *Myiarchi* are abundant, and are dispersed almost everywhere in the forests and on the plains.

"The following table, although very incomplete, will give a sort of parallelism of the most characteristic species of each of the two ornithological regions of the isthmus.

"CÔTE ORIENTALE.	"CÔTE OCCIDENTALE.
"*Turdus grayi.*	"*Turdus flavirostris.*
"*Campylorhynchus zonatus.*	"*Campylorhynchus humilis.*
"*Thryothorus maculipectus.*	"*Thryothorus pleurostictus.*
"*Granatellus sallæi.*	"*Granatellus venustus.*
"*Hæmophila rufescens.*	"*Hæmophila ruficauda.*
"*Cyanospiza parellina.*	"*Cyanospiza leclancheri.*
"*Cassiculus prevosti.*	"

" *Icterus mesomelas.*	" *Icterus pectoralis.*
" *Psilorhinus morio.*	" *Calocitta formosa.*
" *Momotus lessoni.*	" *Momotus mexicanus.*
" *Trogon caligatus.*	" *Trogon citreolus.*
" *Piaya cayana.*	" *Piaya mexicana.*
" *Conurus aztec.*	" *Conurus petzi.*
" *Chrysotis autumnalis.*	" *Chrysotis finschi.*
" *Ortalida vetula.*	" *Ortalida poliocephala.*
" *Ortyx pectoralis.*	" *Ortyx coyolcos.*

"The preceding remarks apply exclusively to indigenous species. It would be interesting if I could record here some facts relative to the distribution of the species which reside in the isthmus in the winter-season, or only during their flight; but this study would require several years of continued observations which were made simultaneously on both coasts. This part of Mexico is, moreover, less favorable than any other for observations of this kind. The shrinking of the continent, the absence of natural barriers, there make the dispersion of traveling-birds, from east to west and *vice versa*, very easy. Another cause, which must bring several migratory species on the shores of the Gulf of Tehuantepec in winter, is the prevalence of northeast winds in the isthmus. These winds, which blow there with extreme violence from the mouth of October, undoubtedly force a large number of birds that are traveling along the Atlantic shore toward Central America to swerve from this line and push them toward the opposite coast. An analogous cause, the prevalence of southeast winds from the month of March, that is to say that the time that the emigrant species return to the north, operates with an inverse action, by bringing the species coming from the south along the eastern shore toward the coasts of the Gulf of Mexico. I will limit myself to state here the presence in winter of *Dendræca graciæ* in the mountains of Tehuantepec, and the extraordinary abundance at the same time of *Chondestes grammaca* and *Euspiza americana* on the plains of the Pacific.

"The shores of the Gulf of Tehuantepec, or, to speak more properly, those of the salt-lakes communicating with the ocean, which extend from Ventosa nearly to Tonala, are inhabited by a great number of aquatic birds. Although belonging, for the most part, to northern species, it is probable that a large number of them make their nests there. I have found there in August, a time when the migratory birds have not

yet made their appearance in Mexico, examples of *Numenius*, *Limosa*, *Calidris*, *Ereunetes*, &c.

"An interesting fact to be observed is that the greater part of the *Laridæ* which I have gathered on the shores of the Gulf of Tehuantepec are identical with those of the Atlantic. I will give as examples *Chroicocephalus atricilla*, *Sterna anglica*, *Sterna antillarum*, *Hydrochelidon fissipes*, and *Rhynchops nigra*.

"Professor Baird (Review of North American Birds, p. 267, and Distribution and Migration of North American Birds) has already mentioned, as a fact worthy of notice, the presence of the first three of these species at Mazatlan. He speaks of the *S. antillarum* as a winter resident at Mazatlan, Colima, and Manzanillo. It is curious that on the shores of the Gulf of Tehuantepec the opposite appears to take place. At San Mateo del Mar, a village eight leagues from Tehuantepec, I have not seen, in the months of February and December, 1869, and February, 1870, a single bird of this species (*S. antillarum*); while in August, 1869, they appeared there in considerable numbers. The natives have assured me that in the month of June this *Sterna* makes its nest on the sand-banks which intersect the lakes in the neighborhood."

Fam. TURDIDÆ.

1. **Catharus occidentalis**, Scl.

"Sierra Madre, *près* Zapotitlan; January, 1870."

2. **Turdus mustelinus**, Gm.

"Tehuantepec City."

3. **Turdus swainsoni**, Cab.

"Tehuantepec (Tapana); April 14, 1869.

"Iris brown; bill black; base of lower mandible whitish; feet pale brownish."

4. **Turdus grayi**, Bp.

"Tehuantepec (Santa Efigenia); December, 1868.

"Iris brown; bill greenish-olive; feet livid fleshy.

"I have only observed this species at Santa Efigenia, where it is not very abundant, and where its presence is explained probably by the neighborhood of the Sierra de Chimalapa."

5. **Turdus flavirostris**, Sw.

"Tehuantepec City; November, 1869.

"Iris cinnamon; bill yellowish, tip dusky; feet dull flesh-color."

This is an abundant species in Western Mexico, to which section it seems to be restricted; common at Mazatlan, and also obtained on the Tres Marias Islands by Colonel Grayson.

6. Melanotis cærulescens (Sw.).

"Sierra Madre, *près* Zapotitlan; January, 1870."

7. Harporhynchus curvirostris (Sw.).

"Tehuacan (Puebla); August, 1868.

"Iris orange; bill black; feet livid blue; vulgar name Cuitlacochi."

8. Mimus polyglottus var. **caudatus,** Baird.

"Tehuantepec City; October, 1869.

"Iris orange-yellow; bill and feet black."

9. Mimus gracilis, Cab.

"Tehuantepec City; October, 1869.

"Iris orange-yellow; bill and feet black."

There are six specimens which I consider to be this species. They differ from examples from Yucatan in being rather smaller and more slender; in having the wings and tail brownish black, and the color of the upper plumage of a brownish ash. In Yucatan specimens, the wings and tail are deep black, and the upper parts bluish ash. These last agree closely with Cabanis's description of *M. gracilis.* The specimens under examination were collected in October. The differences in color may be seasonal.

Fam. SYLVIIDÆ.

10. Polioptila cærulea, Linn.

"Tehuantepec (Santa Efigenia), Juchitan; August and December, 1868.

"Iris brown; upper mandible brownish, lower whitish; feet black.

"This species, which is not uncommon in the neighborhood of Santa Efigenia, only resides there perhaps in winter, or during the flight. I have not seen it there since the month of March."

11. Polioptila albiloris, Sel.

"Tehuantepec (Santa Efigenia), Tehuantepec City; May and December.

"Iris dark brown; bill black, except two-thirds of basal portion of lower mandible, which is light plumbeous; feet plumbeous."

12. Polioptila nigriceps, Baird.

"Tehuantepec (Tapana, Santa Efigenia); Quiotepec (Oaxaca); April.

'Iris brown; basal half of lower mandible plumbeous, upper mandible and tip black; feet plumbeous.

"Common almost everywhere in the west of the isthmus and in the dry and warm districts of the State of Oaxaca; frequents the ravines and the thin woods; goes almost always in pairs."

Fam. TROGLODYTIDÆ.

13. Campylorhynchus zonatus, Less.

"Tehuantepec (Guichicovi); September.

"Iris cinnamon-red; upper mandible black; lower horny; feet yellowish olive."

14. Campylorhynchus jocosus, Scl.

"Dondominguello (Oaxaca); August, 1868.

"Iris red brown; bill blackish; feet dusky ash."

15. Campylorhynchus humilis, Scl.

"Tehuantepec (Santa Efigenia); Tehuantepec City.

"Iris bright brick-red; bill blackish; basal half of lower mandible and feet light plumbeous.

"This is the most common species of the genus that I have met with on the shores of the Gulf of Tehuantepec. It advances toward the northeast to San Carlos, on the route from Tehuantepec to Oaxaca. It is a very lively bird, whose song at the time of mating is agreeable and varied; except at this time, when it lives in pairs, it is almost always seen in small flocks."

16. Salpinctes obsoletus (Say).

"Tehuantepec (Cacoprieto); June, 1872."

17. Cyphorinus leucostictus, Cab.

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; bill black; feet dark plumbeous."

18. Thryothorus maculipectus, Lafr.

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; upper mandible black, lower horn-color; feet dark ashy-blue."

19. Thryothorus pleurostictus, Scl.

"Tehuantepec (Santa Efigenia), Guichicovi, Tapana; March to October.

"Iris brown; upper mandible brownish-black, lower light bluish-fleshy; feet light-brown."

"One of the indigenous birds, the most dispersed in the woody localities on the west of the isthmus, and the only sylvicoline wren that I have there met with up to this time. Endowed with extreme vivacity, it is continually in motion, running along the ground and climbing the shrubs and creepers, in search of insects; and this occupation is always enlivened by the cries of pleasure or the animated trills of the male bird, which reveal his distant position in the interior of the wood. Besides, it is quite tame, and may be easily approached; the report of a gun, even, does not appear to frighten it much. In very woody spots, several couples of them are often seen devoting themselves with ardor to the chase, or busy carrying materials destined for the construction of their nests. This nest, made with skill, is woven with dry grasses, whose stems are fine and elastic. It has the form of a retort, and is fixed horizontally around the stem of a bush, often at the fork of two branches. From the beginning of May to the middle of July, I have found these nests, containing from 3 to 5 eggs of a beautiful greenish-blue color, clear, and of a diameter of about 22 millimeters. The bottom of the nest, where the eggs rest, is lined with hairs, mingled with the fine down of certain seeds of *Bombacées*."

20. Thryothorus bewickii var. **leucogaster,** Baird.

"Puente Colorado; August, 1868.

"Iris brown; bill and feet dusky."

Fam. MOTACILLIDÆ.

21. Anthus ludovicianus (Gm.).

"Tehuantepec City; November, 1869.

"Bill blackish; base of lower mandible dull yellowish; feet brownish."

Fam. MNIOTILTIDÆ.

22. Seiurus auricapillus (Linn.).

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; upper mandible blackish-brown, lower and feet light-fleshy."

23. Seiurus noveboracensis (Gm.).

"Tehuantepec (Tapana); April, 1869.

"Iris brown; bill black; base of lower mandible paler; feet light-brown."

24. Seiurus ludovicianus (Aud.).

"Tehuantepec (Barrio, Santa Efigenia); September and January.

"Iris brown; bill blackish; lower mandible paler; feet pale-fleshy."

25. Mniotilta varia (Linn.).

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; upper mandible black, lower fleshy; tarsi dark olivaceous; toes olivaceous yellow."

26. Parula americana (Linn.).

"Tehuantepec (Santa Efigenia), Tehuantepec City; October and January.

"Iris brown; upper mandible brown, lower whitish-brown at tip; feet brownish."

27. Helminthophaga ruficapilla (Wils.).

"Tehuantepec (Santa Efigenia); December and January.

"Iris brown; bill bluish-ash, culmen dusky; feet olive-brown."

28. Helminthophaga peregrina (Wils.).

"Tehuantepec (Santa Efigenia); December and January.

"Iris brown; bill ashy, culmen and tip dusky; feet dull olive."

29. Dendrœca æstiva (Gm.).

"Tehuantepec (Barrio, Chihuitan, Guichicovi, Santa Efigenia), Dondominguillo (Oaxaca); August to December, January and February.

"Iris brown; upper mandible black, lower light plumbeous; feet light brownish-yellow."

30. Dendrœca virens (Gm.).

"Tehuantepec (Santa Efigenia); December and January.

"Iris brown; bill and feet brownish."

31. Dendrœca coronata (Linn.).

"Tehuantepec (Santa Efigenia); December and January.

"Iris brown; bill and feet black."

32. Dendrœca blackburniæ (Gm.).

"Tehuantepec City."

33. Dendrœca castanea (Wils.).

"Tehuantepec City; October, 1869.

"Iris brown; upper mandible brownish, lower yellowish; feet brownish-yellow."

34. Dendrœca maculosa (Gm.).

"Tehuantepec (Santa Efigenia); December and March.

"Iris brown; bill ashy; culmen and a line along the lower mandible dusky; feet brownish, toes tinged with yellow."

35. Dendrœca dominica var. **albilora,** Baird, Am. Nat., 1873, p. 606.

"Chiapas (Gineta Mountains); January, 1869."

36. Dendrœca graciæ, Coues.

"Sierra Madre, *près* Zapotitlan; January, 1870."

37. Oporornis formosus (Wils.).

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; upper mandible brownish-black, lower brownish-black, except at base, which, with the feet, are light fleshy."

38. Myiodioctes cærulescens (Gm.).

"Tehuantepec (Barrio, Guichicovi); September, 1869.

"Iris brown; upper mandible brownish, lower paler; feet light brownish-yellow."

39. Myiodioctes pusillus var. **pileolatus** (Pallas.). See Ridgway, Am. Nat., 1873, p. 808.

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; bill brownish, lower mandible yellowish; feet light-brown."

40. Basileuterus rufifrons (Sw.).

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; bill black; feet fleshy."

41. Setophaga ruticilla (Linn.).

"Tehuantepec (Santa Efigenia); April, 1871."

42. Setophaga picta, Sw.

"Chiapas (Gineta Mountains); January, 1869."

43. Setophaga miniata, Sw.

"Sierra Madre, *près* Zapotitlan; January, 1870."

44. Granatellus venustus, Dubus.

"Tehuantepec (Santa Efigenia); January, 1869.

"Iris brown; upper mandible brownish-black, lower plumbeous ashy; *feet dull* ashy-brown."

45. Geothlypis philadelphia var. **macgillivrayi** (Aud.).

"Tehuantepec (Chihuitan); Tehuantepec City; November, 1868.

"Iris brown; bill blackish, most of lower mandible pale; feet light flesh."

46. Icteria virens (Linn.).

"Tehuantepec (Chihuitan, Santa Efigenia); November and January.

"Iris brown; upper mandible blackish, lower whitish; feet dull ashy."

Fam. HIRUNDINIDÆ.

47. Progne leucogaster, Baird.

"Tehuantepec (Barrio); October, 1868.

"Iris dark-brown; bill black; feet brownish."

48. Hirundo horreorum, Barton.

"Tehuantepec City; October. Tehuacan (Puebla); August.

"Iris brown; bill brownish-black; feet brown."

49. Petrochelidon swainsoni, Scl.

"Tehuantepec City; October, 1869.

"Iris and bill dark-brown; feet grayish-brown."

50. Cotyle riparia (Linn.).

"Tehuantepec City; October, 1869."

Fam. VIREONIDÆ.

51. Vireosylvia flavoviridis, Cass.

"Tehuantepec (Tapana, Santa Efigenia); April and May.

"Iris red; bill dusky above, light ash beneath; feet light brownish-ash."

52. Vireosylvia gilva var. **swainsoni,** Baird.

"Tehuantepec (Santa Efigenia); January, 1869, April, 1871."

53. Vireo noveboracensis (Gm.).

"Tehuantepec (Santa Efigenia); December, 1868."

54. Vireo flavifrons, Vieill.

"Tehuantepec (Santa Efigenia); Chiapas (Gineta Mountains); December and January.

"Iris brown; bill bluish-ash, culmen and tip of both mandibles dusky; feet bluish-ash."

55. Lanivireo solitarius (Wils.).

"Tehuantepec (Santa Efigenia); Tehuantepec City; Chiapas (G Mountains); October and January.

"Iris brown; bill plumbeous, culmen and tip dusky; feet plumbe

56. Vireo belli, Aud.

"Tehuantepec (Santa Efigenia); Tehuantepec City; October December.

"Iris brown; upper mandible brownish, lower and feet light beous."

57. Vireo hypochryseus, Scl.

"Quiotepec (Oaxaca); August, 1868."

58. Hylophilus decurtatus (Bonap.).

"Tehuantepec (Chimalapa); March, 1869.

"Iris brown; feet light-brown."

59. Cyclorhis flaviventris, Lafr.

"Tehuantepec (Guichicovi, Petapa); September, 1869.

"Iris cinnamon; upper mandible light-brownish fleshy, lower bl feet fleshy."

Fam. LANIIDÆ.

60. Collurio ludovicianus var. **excubitoroides** (Sw.).

"Tehuantepec City; October, 1869.

"Iris brown; bill black; base of lower mandible paler; feet grayish-ash."

Fam. AMPELIDÆ.

61. Ampelis cedrorum (Vieill.).

"Tehuantepec."

Fam. TANAGRIDÆ.

62. Euphonia affinis (Less.).

"Tehuantepec (Barrio); Tehuantepec City; October, 1868.

"Iris brown; bill black, bases of both mandibles light-bluish; dark lead-color."

63. Euphonia hirundinacea, Bp.

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; upper mandible and tip of lower black, rest of l bluish; feet ashy-plumbeous."

64. Chlorophonia occipitalis (Du Bus.).

"Chiapas (Gineta Mountains); January, 1869."

65. Tanagra abbas, Licht.

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; bill black; feet dark-plumbeous."

66. Pyranga æstiva (Gm.).

"Tehuantepec (Chihuitan, Santa Efigenia); November and January.

"Iris brown; bill light fleshy-brown; culmen dusky; feet brownish."

There are four specimens (two of each sex), which do not differ from specimens of *P. æstiva* from the Atlantic States. The variety named *P. cooperi* by Mr. Ridgway thus appears to range farther to the north.

67. Pyranga hepatica, Sw.

"Tehuantepec (Guichicovi); Chiapas (Gineta Mountains); September and January.

"Iris brown; bill bluish, culmen and tip of lower mandible dusky; feet light brownish-ash."

68. Pyranga ludoviciana (Wils.).

"Tehuantepec (Ishuatlan, Santa Efigenia); December and January.

"Iris brown; bill yellowish, culmen dusky; feet dark ashy."

69. Phænicothraupis rubicoides (Lafr.).

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; bill and feet hazel-brown."

70. Phænicothraupis fuscicauda, Cab.

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; bill black, tip yellow; feet light-brown."

71. Lanio aurantius, Lafr.

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; bill black; feet grayish."

72. Saltator grandis (Licht.).

"Tehuantepec (Santa Efigenia); January, 1869."

73. Saltator atriceps, Less.

"Tehuantepec (Guichicovi, Santa Efigenia); September, December, and February.

"Iris brown; bill black; feet brownish."

Fam. FRINGILLIDÆ.

74. Hedymeles ludovicianus (Linn.).

"Tehuantepec (Santa Efigenia); January, 1869."

75. Cardinalis virginianus var. **carneus,** Less.

"Huamelula."

76. Guiraca cærulea (Linn.).

"Tehuantepec (Chihuitan); Huitzo, near Oaxaca; August and November.

"Iris brown; bill and feet dusky."

77. Guiraca parellina (Licht.).

"Tehuantepec City, Huallago; October and December.

"Iris brown; bill and feet grayish-brown."

78. Volatinia jacarina (Linn.).

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; bill black, most of lower mandible bluish; feet blackish."

79. Phonipara pusilla (Sw.).

"Dondominguillo (Oaxaca); August, 1868.

"Iris brown; bill black; feet light-brown."

80. Cyanospiza cyanea (Linn.).

"Tehuantepec (Santa Efigenia); December, 1868.

"Iris brown; bill dull fleshy; feet brownish."

81. Cyanospiza ciris (Linn.).

"Tehuantepec (Santa Efigenia); Tehuantepec City; November and December.

"Iris brown; bill and feet brownish."

82. Cyanospiza leclancheri (Lafr.).

"Tehuantepec (Tapana); Tehuantepec City; April and October.

"Iris brown; upper mandible brown, lower fleshy; feet brownish."

83. Cyanospiza rositæ, Lawr. Ann. Lyc. N. Y., vol. x, p. 397.

"Tehuantepec (Cacoprieto); January, 1872.

"Iris brown; upper mandible blackish; lower pale-bluish; feet livid-plumbeous. Total length, 14 centimeters; wing, 72 millimeters; tail, 55 millimeters."

Since my description of the male of this species, the missing specimens, fortunately, have been received. An examination of the male shows no point of difference from my description worthy of comment.

There is but a single specimen of the female (the only one as yet obtained), of which a description is now given.

Plumage above of a dull ochreous-brown, tinged with blue on the

head and lower back; rump and upper tail-coverts dull light-blue; middle tail-feathers dull blue, the outer webs of the other tail-feathers similar in color, the inner webs blackish-brown; quill-feathers dark-brown; the smaller wing-coverts and the outer edges of the larger quills pale-blue; the other wing-coverts and the tertiaries have margins the color of the back; chin grayish; under plumage of a dull brownish rose-color, paler and clearer on the abdomen and under tail-coverts; bill and feet similar in color to those of the male. Types in National Museum, Washington, D. C.

84. Euspiza americana (Gm.).

"Tehuantepec (Juchitan, Guichicovi); Tehuantepec City; September and October.

"Iris brown; bill brownish, tinged with yellow; feet hazel-brown."

85. Passerculus savanna var. **alaudinus**, Bp.

"Tehuantepec City; November, 1869.

"Iris brown; upper mandible brownish, lower mandible and feet fleshy."

86. Zonotrichia mystacalis, Hartl.

"Tehuacan (Puebla); August, 1868.

"Iris reddish-brown; upper mandible black, lower light-blue; feet fleshy."

87. Spizella socialis (Wils.).

"Chiapas (Gineta Mountains); January, 1869.

88. Spizella socialis var. **arizonæ**, Coues.

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; upper mandible brown, lower mandible lighter; feet brownish flesh."

89. Spizella atrigularis, Cab.

"Chapulco (Puebla); January, 1868.

"Iris brown; bill brownish-orange; feet brownish."

90. Peucæa ruficeps var. **boucardi**, Scl.

"Puente Colorado (Puebla); August, 1868.

"Iris brown; upper mandible horny-brown, lower bluish; feet fleshy."

91. Coturniculus passerinus (Wils.).

"Tehuantepec City; November, 1869.

"Iris brown; upper mandible dusky, lower light-bluish; feet fleshy."

92. Embernagra rufivirgata, Lawr.

"Huamelula."

93. Hæmophila rufescens, Sw.

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; upper mandible black, lower bluish; feet dark flesh-color."

94. Hæmophila ruficauda (Bonap.).

"Tehuantepec (Juchitan, Santa Efigenia); Tehuantepec City.

"Iris light reddish-brown; upper mandible black, lower bluish-fleshy; feet fleshy-brown."

95. Hæmophila sumichrasti, Lawr., Ann. N. Y. Lyc., vol. x, p. 6.

"Tehuantepec (Juchitan); September, 1868.

"Iris brownish-red; upper mandible blackish, lower mandible and feet fleshy."

96. Pipilo maculatus, Sw.

"Cieneguilla (Oaxaca, alpine region)."

97. Pipilo albicollis, Scl.

"Huitzo, near Oaxaca; August, 1868.

"Iris brown; upper mandible brownish, lower bluish-ash; feet grayish-brown."

98. Chondestes grammaca (Say).

"Tehuantepec (Chihuitan, Santa Efigenia); November, December, and January.

"Iris brown; bill bluish; culmen and tip dusky; feet fleshy."

99. Chrysomitris notata (Du Bus.).

"Chiapas (Gineta Mountains); January, 1869.

"Iris brown; upper mandible blackish-brown, lower dull-ashy; feet brownish."

Fam. ALAUDIDÆ.

100. Eremophila alpestris var. **chrysolæma** (Wagl.).

"Tehuantepec (San Mateo); August, 1869.

"Probably resident on the Pacific plains, where it seems to be abundant in July and August.

Fam. ICTERIDÆ.

101. Cassiculus melanicterus (Bp.).

"Tehuantepec (Barrio, Chihuitan); Tehuantepec City; October, November, and December.

"Iris brown; bill greenish-white; feet blackish-brown.

"This bird (called by the Creoles *Tordo de fierro* (Iron Thrush), and by the Zapotèques *bigoseguiba*, which has the same meaning), although proper to Western Mexico, often wanders from the coast. A few years ago I found it near Tehuacan (State of Puebla). In the isthmus it is especially abundant near Chihuitan and Huallaga. Like *Cassicus prevosti*, it has a disagreeable smell, and is generally infested with vermin."

102. Cassicus prevosti (Less.).

"Tehuantepec (Guichicovi, Santa Efigenia); May and September.

"Iris light-yellow; bill yellowish-white; feet bluish-ash."

103. Icterus prosthemelas (Strickland).

"Tehuantepec (Chihuitan); December, 1868."

104. Icterus melanocephalus (Wagl.).

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; bill black; base of lower mandible and feet bluish-ash."

105. Icterus mesomelas (Wagl.).

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; bill black; base of lower mandible and feet bluish-ash."

106. Icterus gularis (Wagl.).

"Tehuantepec (Barrio, Chihuitan, Juchitan, Santa Efigenia).

"Iris brown; bill black, with the base of the lower mandible and feet bluish-ash."

107. Icterus pectoralis (Wagl.).

"Tehuantepec (Juchitan, Santa Efigenia); June and September.

"Iris dark-brown; bill black; base of lower mandible bluish; feet bluish-ash."

108. Icterus formosus, Lawr., Ann. N. Y. Lyc., vol. x, p. 184.

"Tehuantepec (Santa Efigenia, Juchitan); June, September, and December.

"Iris brown; bill black; base of lower mandible and feet light-plumbeous."

109. Icterus spurius var. **affinis,** Lawr.

"Tehuantepec (Chihuitan, Santa Efigenia); Tehuantepec City.

"Iris brown; upper mandible black, lower ashy-blue; feet dark ashy-blue."

110. Molothrus æneus (Wagl.).

"Tehuantepec (Tapana); April, 1869.

"Iris red; bill and feet black."

111. Molothrus pecoris var. **obscurus** (Gm.).

"Tehuantepec City; October, 1869.

"Iris brown; feet black."

112. Sturnella magna var. **mexicana,** Scl.

"Tehuantepec (Barrio, Santa Efigenia); September and February.

"Iris hazel-brown; feet light fleshy-brown."

113. Quiscalus macrurus, Sw.

"Tehuantepec (Barrio, Juchitan); September and October.

"Iris pale-yellow; bill and feet black."

114. Quiscalus mexicanus, Cass.

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; bill and feet black; inside of bill yellow."

Fam. CORVIDÆ.

115. Cyanocitta coronata (Sw.).

"Cieneguilla (Oaxaca, alpine region); August, 1868.

"Iris brown; bill and feet black."

116. Cyanocitta californica var. **sumichrasti,** Ridg.

"Nacaltepec (Oaxaca); August, 1868.

"Iris brown; bill and feet black."

117. Calocitta formosa (Sw.).

"Tehuantepec (Juchitan); Tehuantepec City; August, September, and November.

"Iris brown; bill and feet black.

"This is the most widely scattered and the greatest busybody of all the birds of the isthmus. You cannot take a step out of inhabited localities without being assailed by the vexatious scoldings of these *Chavis* (that is the name which is given to them). Not content with

hooting at you as you pass, they torment you, follow you, cross the road in front of you, and accompany these gymnastic performances by clapping their bills, by whistling, by scolding in every tone and on every key. Excessively bold, it does not fear to approach farms and feed upon the meat which is put out to dry in the sun (*tasajo*), in company with species of *Cathartes* and *Quiscalus*. If an animal, a horse or an ox, for example, should fall exhausted from the effects of a wound, the *Chavis* make no scruple of attacking the wounded spot, either to carry off the pieces of flesh which are loose, or perhaps to obtain the larvæ of carnivorous flies which are developed there."

118. Xanthura guatemalensis (Bp.).

"Tehuantepec (Santa Efigenia); December and January.

"Iris yellow; bill black; feet ashy-blue."

119. Psilorhinus morio (Licht.).

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; bill yellow; feet black, mixed with yellow."

120. Corvus corax var. **carnivorus**, Bartram.

"Tehuantepec (Barrio, Tapana); April, 1869.

"Iris brown; bill and feet black."

Fam. DENDROCOLAPTIDÆ.

121. Dendrornis eburneirostris (Sw.).

"Tehuantepec (Guichicovi, Ishuatlan, Tapana, Santa Efigenia).

"Iris brown; bill whitish horn-color; sides of upper mandible brownish; feet dull-olive."

Fam. TYRANNIDÆ.

122. Attila citreopygius (Bp.).

"Tehuantepec (Santa Efigenia); May, 1871.

"Iris cinnamon; bill horny; feet plumbeous."

123. Sayornis sayus (Bp.).

"Chapulco (Puebla); August, 1868.

"Iris brown; bill and feet black."

124. Sayornis nigricans (Sw.).

"Tanatepec."

125. Todirostrum schistaceiceps, Scl.

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; bill black, extreme tip whitish; feet light-bluish."

126. Oncostoma cinereigulare, Scl.

"Tehuantepec (Guichicovi, Cacoprieto, Tapana, Santa Efigenia); April to September.

"Iris grayish-white; bill black; medial face of lower mandible whitish; feet fleshy."

127. Ornithion incanescens (Max.); (**Camptostoma imberbe,** Scl., see P. Z. S., 1873, p. 577).

"Tehuantepec (Santa Efigenia); December and January.

"Iris brown; bill black; base of lower mandible yellowish; feet blackish-ash; commissure and mouth orange."

128. Myiozetetes texensis (Giraud).

"Tehuantepec (Juchitan, Barrio, Chihuitan, Santa Efigenia).

"Iris brown; bill and feet black."

129. Rhynchocyclus cinereiceps (Scl.).

"Tehuantepec (Tapana, Santa Efigenia); January to May.

"Iris pearl-gray; upper mandible blackish; lower mandible and feet dull flesh-color; interior of mouth black."

130. Pitangus derbianus (Kaup).

"Tehuantepec (Chihuitan, Tapana, Santa Efigenia).

"Iris brown; bill and feet black."

131. Myiodynastes luteiventris, Bp.

"Tehuantepec (Tapana); April, 1869.

"Iris brown; bill black; extreme base of lower mandible dull-fleshy; feet dark brownish-ash."

132. Megarhynchus mexicanus (Lafr.).

"Tehuantepec (Guichicovi, Chihuitan, Santa Efigenia).

"Iris brown; bill and feet black."

133. Muscivora mexicana, Scl.

"Tehuantepec (Tapana, Santa Efigenia); June and December.

"Iris brown; bill black; central part of lower mandible yellowish; feet fleshy-yellow."

134. Pyrocephalus rubineus var. **mexicanus**, Scl.

"Tehuantepec (Santa Efigenia); Tehuantepec City.

"Iris brown; bill and feet black."

135. Empidonax minimus (Baird).

"Tehuantepec (Chihuitan, Santa Efigenia, Tapana, Guichicovi); Tehuantepec City; Chiapas (Gineta Mountains).

"Iris brown; upper mandible brownish-black, lower dull-fleshy; feet black."

136. Empidonax flaviventris (Baird).

"Tehuantepec (Guichicovi, Santa Efigenia); December and January.

"Iris brown; upper mandible brownish-black, lower yellowish; feet blackish."

137. Empidonax traillii var. **pusillus** (Sw. et Rich.).

"Tehuantepec City; October, 1869.

"Iris brown; upper mandible black, lower light-brownish; feet black."

138. Empidonax hammondi (De Vesey).

"Chiapas (Gineta Mountains); January, 1869.

"Iris brown; upper mandible blackish, lower light-brownish; feet black."

139. Contopus borealis (Sw.).

"Tehuantepec (Icacoprieto); September, 1872."

140. Contopus pertinax, Cab. et Heine.

"Chiapas (Gineta Mountains); January, 1869."

141. Contopus virens (Linn.).

"Tehuantepec (Tapana); April and May.

"Iris brown; upper mandible black, lower dull-yellow; feet black."

142. Contopus virens var. **richardsonii** (Sw.).

"Tehuantepec (Tapana); Tehuantepec City; April, May, and October.

"Iris brown; upper mandible black, basal half of lower brownish-yellow; feet black."

143. Myiarchus crinitus (Linn.).

"Tehuantepec City; October, 1869.

"Iris brown; bill black, lighter at the base of lower mandible; feet

"

144. Myiarchus crinitus var. **cooperi** (Kaup).

"Tehuantepec (Tapana, Santa Efigenia); April and December.

"Iris brown; bill black; feet dark ashy-brown."

145. Myiarchus cinerascens (Lawr.).

"Tehuantepec (Tapana, Santa Efigenia); Tehuantepec City; Chiapas (Gineta Mountains); April, October, November, and January.

"Iris brown; bill black; extreme base of lower mandible dull-fleshy; feet blackish."

146. Myiarchus lawrencei (Giraud).

"Tehuantepec (Santa Efigenia); Dondominguillo (Oaxaca)."

147. Myiarchus flammulatus, Lawr., Ann. Lyc. N. Y., vol. xi, p. 71.

"Tehuantepec (Cacoprieto); June, 1872."

148. Tyrannus melancholicus var. **satrapa** (Licht.).

"Tehuantepec (Chihuitan, Tapana, Barrio); Dondominguillo (Oaxaca).

"Iris dark-brown; bill black; feet brownish."

149. Tyrannus crassirostris, Sw.

"Tehuantepec (Chihuitan); Los Cues (Oaxaca).

"Iris dark-brown; bill and feet blackish."

150. Tyrannus carolinensis (Gm.).

"Tehuantepec (Tapana); May, 1869.

"Iris brown; bill black; feet dark-plumbeous."

151. Milvulus forficatus (Gm.).

"Tehuantepec (Chihuitan); Tehuantepec City.

"Iris brown; upper mandible blackish, lower paler; feet brown."

Fam. COTINGIDÆ.

152. Tityra personata, Jard. and Selb.

"Tehuantepec (Tapana, Santa Efigenia); March, April, and January.

"Iris dull cinnamon-red; bill black at end for half its length; basal half of bill, lores, and orbits pale-carmine; feet ashy-brown."

153. Hadrostomus aglaiæ (Lafr.).

"Dondominguillo (Oaxaca); August, 1868.

"Iris brown; upper mandible blackish, lower bluish horn-color; feet ashy-blue."

Fam. PIPRIDÆ.

154. Chiroxiphia linearis (Bonap.).

"Tehuantepec (Tapana); June, 1869.

"Iris dark-brown; bill black; feet orange.

"This Manakin, the only one that I have found in the western part of the isthmus, dwells only in certain localities, thickly wooded, at the foot of the Cordilleras, on the banks of streams, and still it is only in the solitary ravines and the most shady nooks that they need be looked for. Very difficult to discover at any other time in the midst of the thick forests that they choose for their dwelling, their retreat is easily discovered in the breeding-season by the loud and continuous cries made by the males during the greater part of the day. Two males are almost always found together, perched side by side on the same branch; a curious fact which I have a long time wondered at, but the following observation enlightened me. A female, pluming herself, is perched a few steps away from these two gallants, who, anxious to please her, begin a loving joust the most diverting, ascending and descending with their wings half-closed, their feathers disheveled, and their throats inflated with pleasure and the effort of singing. This continues sometimes for more than a quarter of an hour, and recommences after a few minutes' rest, during which the female shows her pleasure by the trembling of her body and the fluttering of her wings. Nothing can be more graceful than this picture when a ray of sunlight, piercing the dark vault of the forest, enlivens the scene and brings out the bright tints of black velvet, of azure and purple that adorn the coats of these little feathered actors. With an excessive natural confidence, the *Chiroxiphia* allow themselves to be approached very near without showing any fear, and the sound of a gun hardly frightens them."

Fam. MOMOTIDÆ.

155. Momotus lessoni, Less.

"Tehuantepec (Guichicovi, Chimalapa); March and September.

"Iris red; bill black; feet blackish."

156. Momotus mexicanus (Sw.).

"Tehuantepec (Chihuitan, Barrio, Santa Efigenia); Los Cues (Oaxaca); August to December.

"Iris red; bill black; base of lower mandible whitish horn-color; feet dull cinereous.

"This is very common in all the western regions of the isthmus from Barrio to the Pacific. It comes from there through the State of Oaxaca to Tehuacan (Puebla), where it is not rare. It is almost universally called *guarda-barranca* or *garde ravin*, because it generally lives in ravines, and digs its nest along the sides."

157. Eumomota superciliaris (Sandb.).

"Tehuantepec (Tapana, Cacoprieto); April and May.

"Iris dark-brown; bill black; feet grayish-black."

Fam. ALCEDINIDÆ.

158. Ceryle torquata (Linn.).

"Tehuantepec (Chihuitan, Santa Efigenia); November and December.

"Iris dark-brown; bill black; base of both mandibles grayish; feet light olive-green."

159. Ceryle alcyon (Linn.).

"Tehuantepec (Santa Efigenia); December, 1868.

"Iris dark-brown; bill black, basal half of lower mandible whitish horn-color; feet dusky."

160. Ceryle amazona (Lath.).

"Tehuantepec (Chihuitan, Santa Efigenia); November, December, and January.

"Iris dark-brown; bill and feet black."

161. Ceryle americana var. **cabanisi,** Tsch.

Tehuantepec (Chihuitan, Santa Efigenia); November, December, and January."

162. Ceryle superciliosa (Linn.).

"Tehuantepec (Santa Efigenia); April, 1871.

"Iris brownish-black; bill black; base of lower mandible fleshy; feet dark-brown."

Fam. BUCCONIDÆ.

163. Bucco dysoni, Gray.

"Tehuantepec (Santa Efigenia); May, 1871.

"Iris dark purplish-red; feet dull-plumbeous; bill black."

Fam. TROGONIDÆ.

164. Trogon puella, Gould.

"Tehuantepec (Guichicovi, Chimalapa); March and September.

"Iris brown; bill yellow; feet yellowish."

165. Trogon braccatus, Cab. et Heine.

"Tehuantepec (Guichicovi); September, 1869.

"Iris dark-brown; bill ashy-blue; orbits yellow; feet plumbeous."

166. Trogon citreolus, Gould.

"Tehuantepec (Chihuitan, Ventosa, Tapana, Santa Efigenia).

"Iris yellow; eyelids violet-blue; bill bluish-ash; feet cinereous."

Fam. CAPRIMULGIDÆ.

167. Chordeiles texensis, Lawr.

"Tehuantepec (San Mateo, Santa Efigenia); August and January, 1869.

"Iris dark-brown; bill brownish; feet dull-brown.

"At Santa Efigenia, where I killed most of the specimens of this Night-hawk, they live during the day hidden at the foot of mountain in woods and thickets. They come out a short time after sunset, and then appear in great numbers above inundated places and savannas. Their flight is easy and graceful; but it is quite difficult to shoot them, because they easily escape from sight on account of their dark color and the feeble light of the twilight."

168. Antrostomus vociferus (Wils.).

"Tehuantepec City; November, 1869."

169. Nyctidromus albicollis (Gm.).

"Tehuantepec (Chihuitan, Santa Efigenia); November, December, and January.

"Iris dark-brown; bill pale-brown, tip dusky; feet dull-fleshy.

"This species is very common in all the warm and temperate lands of Southern Mexico, where it is known under the name of *Tapas camina* (*conore chemin*) or *Ataja camina* (*qui embarrasse le chemin*), derived from the custom it has of lying flat on the roads. Its cry, which is of two kinds, may be expressed by the syllable *piou - piou - piou - piou—pu - e - i - ou.* The latter part, uttered with force, is probably a cry of appeal (or challenge). The second, which it repeats from time to time, is shorter, *ou - i - iou.*"

170. Nyctibius jamaicensis (Gm.).

"Tehuantepec (Santa Efigenia)."

Fam. CYPSELIDÆ.

171. Chætura vauxii (Towns.).

"Tehuantepec (Guichicovi); September, 1869.

"Iris dark brown; bill black; feet blackish."

Fam. TROCHILIDÆ.

172. Campylopterus hemileucurus (Licht.).

"Chiapas (Gineta Mountains); January, 1869."

173. Lampornis prevosti (Less.).

"Tehuantepec (Santa Efigenia); December, January, and Februa

"Iris dark brown; bill and feet black."

174. Trochilus colubris, Linn.

"Tehuantepec (Santa Efigenia); Tehuantepec City; October, Nov ber, and December.

"Iris brown; bill and feet black."

175. Heliomaster pallidiceps, Gould.

"Tehuantepec (Santa Efigenia); December and January."

176. Heliomaster leocadia (Bourc.).

"Tehuantepec City; October and November, 1869.

"Iris, bill, and feet black."

177. Heliomaster constanti (Delatt.).

"Chiapas (Gineta Mountains); January, 1869."

178. Cyanomia cyanocephala (Less.).

"Tehuantepec (Guichicovi); September and January.

"Iris black; upper mandible black, lower bright carmine, with tip black; feet black."

179. Cyanomia violiceps (Gould).

"Tehuantepec (Tapana, Santa Efigenia); May, December, and J uary.

"Iris brown; bill rosy-red, tip black; feet plumbeous."

180. Pyrrhophæna cinnamomea (Less.).

"Tehuantepec (Santa Efigenia); December and January.

"Iris black; bill bright carmine red, tip black."

181. Pyrrhophæna devillei (Bourc.).

"Chiapas (Gineta Mountains); January, 1869."

182. Pyrrhophæna riefferi (Bourc.).

"Tehuantepec (Guichicovi); September, 1869."

183. Thaumatias candidus (Bourc. et Muls.).

"Tehuantepec (Guichicovi); September, 1869.

"Iris black; upper mandible black, lower light carmine, with the tip black; feet black."

184. Circe doubledayi (Bourc.).

"Tehuantepec (Chihuitan); November, 1868."

A single specimen of this rare species is in the collection, and the only one I have ever seen. Mr. Gould, in his monograph of *Trochilidæ*, says but two specimens were known. Since that time, however, others may have been obtained. I wrote two years since to Professor Sumichrast to endeavor to procure more examples, but he has not as yet been able to do so. Its locality is now determined, which, at the time it was described by Mr. Bourcier, was thought to be the "Rio Negro," though Mr. Gould states that his specimen was marked as from "Chimantla, Mexico," which he thought was correct, as its allies, "with obscure tippings to their tails, such as *latirostris*, *caniveti*, *auriceps*, &c., were denizens of that country."

185. Chlorolampis canaveti (Less.).

"Tehuantepec (Guichicovi); September, 1869.

"Iris and feet black; basal two-thirds of bill carmine-red, terminal third black."

Fam. CUCULIDÆ.

186. Crotophaga sulcirostris, Sw.

"Tehuantepec (Juchitan); September, 1868.

"Iris dark brown; bill and feet black."

187. Diplopterus nævius (Linn.).

"Tehuantepec (Santa Efigenia)."

188. Piaya cayana (Linn.).

"Tehuantepec (Chihuitan, Barrio); September and November.

"Iris red; bill, lores, and orbits light olive-green; feet bluish-ash."

189. Piaya ridibundus (Gm.).

"Tehuantepec City."

190. Morococcyx erythropygia (Less.).

"Tehuantepec (Chihuitan), Tehuantepec City; October and December.

"Iris brown; bill orange-brown; culmen blackish; orbital skin greenish-yellow before the eye and azure-blue behind the eye; feet dull flesh.

"Similar to *Geococcyx mexicanus* in its terrestrial habits. Indeed, it never alights except on the lowest bushes; woody places, *les bejucales* (places full of entangled creepers), and hedges are its favorite spots. It runs very quickly, and easily escapes from sight. Its flesh, like that of the *Geococcyx*, has an unsavory and disagreeable odor."

191. Geococcyx mexicanus (Gm.).

"Tehuantepec (Juchitan); August and September.

"Iris brown, separated from the pupil by a narrow golden ring; orbital skin blue and red; bill bluish-gray, culmen dusky; feet livid bluish.

"This bird, quite common in the west of the isthmus, there bears the name of *Corre-camino* (Spanish) or *Ceré-quidja* (Zapotique)."

Fam. RAMPHASTIDÆ.

192. Pteroglossus torquatus (Gm.).

"Tehuantepec (Santa Efigenia); January and March.

"Iris yellow; orbital skin red; feet greenish-olive.

"Common in the woods at the foot of the Cordilleras at Santa Efigenia, at Tapana, at Tanatepec, &c. I have been told that *Ramphastos carinatus* is found at times in the same localities. I have not there met with it."

193. Campephilus guatemalensis (Hartl.).

"Tehuantepec (Chihuitan), Tehuantepec City; November and December.

"Iris light yellow; bill horny-white; feet ashy."

194. Dryocopus scapularis (Vig.)

"Tehuantepec (Chihuitan, Santa Efigenia); November and December.

"Iris white; bill white; feet dark ashy-blue."

195. Picus scalaris, Wagl.

"Puente, Colorado (Puebla); August, 1868.

"Iris brown; bill blackish; feet greenish."

196. Sphyrapicus varius (Linn.).

"Tehuantepec (Santa Efigenia), Chiapas (Gineta Mountains); January, 1869.

"Bill horny; feet dull greenish."

197. Chloronerpes æruginosus (Licht.).

"Tehuantepec (Tapana, Guichicovi); Chiapas (Gineta Mountains); April, September, and January.

"Iris brown; bill black; feet bluish-ash."

198. Melanerpes formicivorus (Sw.).

"Tehuantepec (Guichicovi); Chiapas (Gineta Mountains); September and January."

199. Centurus aurifrons (Wagl.).

"Tehuantepec (Chihuitan, Juchitan, Santa Efigenia); September, November, and January.

"Iris red; bill blackish; feet dull greenish-ash."

200. Centurus hypopolius (Wagl.).

"Chapulco (Puebla); August, 1868.

"Iris brown; bill blackish; feet ashy-blue."

This seems to be a rare species, as there is but a single specimen in the collection, and I have not met with it in collections from other parts of Mexico or from Guatemala.

Fam. PSITTACIDÆ.

201. Ara macao (Linn.).

"Tehuantepec (Santa Efigenia); Tehuantepec City, December.

"Iris yellow; upper mandible whitish, lower black; skin of cheek rosy-white; feet black.

"Excessively common in all the western part of the isthmus, especially between Niltepec and Tapana. It ascends very high on the sides of the Cordillera, where it is even seen in the pine-forests."

202. Ara militaris (Linn.).

"Mountains north of Tehuantepec."

203. Conurus aztec, Souancé.

"Tehuantepec (Guichicovi); September, 1869.

"Iris reddish-yellow; bill whitish; feet black."

204. Conurus petzii (Leibl.).

"Tehuantepec (Juchitan, Chihuitan, Santa Efigenia); September, November, and December.

"Iris and orbital skin yellow; bill yellowish-white; feet yellowish, marbled with brownish.

"Everywhere abundant; this species lives indifferently in the woods, on plains, and in the neighborhood of inhabited places. It is the same with *Chrysotis albifrons*."

205. Brotogerys tovi (Gm.).

"Tehuantepec (Tapana); June, 1869.

"Iris brown; cere whitish; bill light brown; feet fleshy.

"This little paroquet appears confined in the west of the isthmus to the neighborhood of the villages of Zanatepec and Tapana, where it is called *Catarina* or *Gachupina*. It never leaves the thick woods, where it keeps on the largest and highest trees, which makes its capture quite difficult, because it is confounded with the foliage. It is sought as a pleasure bird on account of its small size and the ease with which it may be tamed. The Indians of the valley of Oaxaca, who come to trade in the State of Chiapas, bring a great number to sell in the interior."

206. Chrysotis farinosa (Bodd.).

"Santa Maria (Chimalapa).

"Another species of *Chrysotis*, although it may be rare, lives in the neighborhood of Tapana (its body is entirely green, the nape of the neck and at times the forehead are spotted with yellow, its beak is blackish, its size that of *C. ochroptera*). I regret that I have been unable as yet to procure specimens of it. I have only seen it in captivity."

207. Chrysotis auropalliata (Less.).

"Tehuantepec (Santa Efigenia); May, 1871.

"Iris orange-red; bill blackish; cere black; feet grayish."

208. Chrysotis levaillantii, Gray.

"Tehuantepec (Barrio, Petapa); October, 1868.

"Iris orange; bill and feet dirty white."

209. Chrysotis autumnalis (Linn.).

"Tehuantepec (Barrio); September, 1868.

"Iris orange-yellow; bill dull yellowish, blackish along the cutting edges; feet light greenish-ash."

210. Chrysotis albifrons, Sparrm.

"Tehuantepec (Chihuitan, Juchitan); Tehuantepec City; October and November.

"Iris yellowish-white; bill light yellow; cere and feet dull white."

211. Chrysotis finschi, Scl.

"Tehuantepec City; October, 1869.

"Iris orange; bill dirty-white; feet light gray."

Fam. STRIGIDÆ.

212. Glaucidium ferruginium (Max.).

"Tehuantepec (Santa Efigenia); Tehuantepec City; Chiapas (Gineta Mountains); October, January, and March.

"Iris yellow; bill, cere, and feet greenish yellow."

213. Glaucidium gnoma (Wagl.).

"Tehuantepec (Tapana); Tehuantepec City; May and October.

"Iris yellow; bill, cere, and feet greenish-yellow."

214. Speotyto cunicularia var. **hypogæa** (Bp.).

"Tehuantepec (Juchitan); January, 1870."

215. Bubo virginianus (Gm.).

"Tehuantepec City; October, 1869.

"Iris yellow; bill blackish; feet dull grayish; nails blackish."

216. Ciccaba nigrolineata, Scl.

"Tehuantepec City."

217. Ciccaba squamulata (Licht.).

"Tehuantepec City; November, 1869."

Upper plumage dark brown, mottled with pale rufous; head, neck, and upper part of back rather sparsely marked with small fulvous-white spots; tail blackish-brown, crossed with six white bars, which are more or less clouded with light brown, ends of tail-feathers white; quills blackish-brown, with faint lighter bars on the inner webs and pale fulvous bars on the outer; inner webs of secondaries clear, very pale fulvous; under lining of wings dark reddish-fulvous; larger wing-coverts ending with reddish-fulvous; under surface white, tinged with fulvous, the feathers marked with conspicuous shaft-stripes of clear dark brown; sides and thighs of a light clear fulvous; bill dusky horn color, the end light yellow; toes brownish-yell

Length (skin), 14½ inches; 1

I feel confident of being correct in referring the bird before me to *Syrnium squamulatum*, and thereby establishing its validity. By late writers, it has been considered identical with *S. virgatum*, Cass. This specimen is clearly distinct from Mr. Cassin's species, in which the coloring is much darker throughout, having the throat and breast of a dark brown, which in *S. squamulatum* are white; the light markings on the upper plumage of *S. virgatum* are rufous and in wavy lines, not, as in the other, in distinct whitish spots; the sides are dull fulvous; the thighs dark reddish-fulvous, with irregular narrow brownish bars; in *S. squamulatum* the thighs are of a very pale clear fulvous and immaculate. There are but five bars on the tail of *S. virgatum*, the other having six. The two species do not differ materially in measurements, except that the tarsi of *S. squamulatum* are much longer.

The only description I have found of this species is by Bonaparte (Cons. Av. i, p. 53), with which the specimen under examination agrees closely. Bonaparte was not acquainted with *S. virgatum*, but probably noticed in Mr. Cassin's description some similarity to that of *S. squamulatum*, as he has, *l. c.*, "*Quid Syrnium virgatum*, Cass."

218. Pulsatrix torquata (Daud.).

"Tehuantepec (Santa Efigenia); January, 1869.

"Iris brownish-orange; bill light greenish-horny; last scutellæ of toes ashy."

219. Strix flammea var. **pratincola**, Bp.

"Tehuantepec City."

Fam. FALCONIDÆ.

220. Spizaëtus manduyti (Daud.).

"Tehuantepec (Santa Efigenia); January, 1869.

"Iris orange-yellow; cere and lorum greenish-yellow; toes yellow.

"Quite common in the large forests of the eastern coast of Mexico; it appears very rarely in the plains of the Pacific, where probably isolated individuals alone are found. This bird has the habits of the buzzards; it never leaves the woods, awaits its prey perched, and lives principally upon rats and other small quadrupeds."

221. Spizaëtus melanoleucus (Vieill.).

"Tehuantepec (Santa Efigenia)."

222. Pandion haliætus var. **carolinensis** (Linn.).

"Tehuantepec (Chihuitan); Ventosa Bay; January, 1871.

[illegible]ellow; feet bluish-ash."

223. Thrasaetus harpyia (Linn.).

"Tehuantepec (Almoloya); October, 1868.

"Iris dark brown; cere and bill black; feet yellowish-white.

"The Harpy Eagle is exceedingly rare in Mexico, of which there is probably not a native bird; and its capture is truly a work of chance. The isolated birds which have been found there up to this time have probably been brought by some atmospheric disturbance, which has driven them beyond the natural limits of the zone in which they live."

224. Hypotriorchis albigularis (Daud.).

"Tehuantepec (Tapana); Oaxaca; June and August.

"Iris dark brown; bill blackish-blue; cere, lores, and orbits yellow; feet orange-yellow.

"Quite universally dispersed in the warm and temperate districts of Mexico; this falcon mounts at times up to the cold regions. It is quite rare in the dry plains which border upon the Gulf of Tehuantepec, and becomes more common as you approach the mountains. It is a resident. It mainly attacks other birds, and vigorously hunts pigeons."

225. Hypotriorchis femoralis (Temm.).

"Tehuantepec City."

226. Tinnunculus sparverius (Linn.).

"Tehuantepec City; October, 1869.

"Iris dark brown; cere, orbits, and feet yellowish."

227. Asturina plagiata (Licht.).

"Tehuantepec (Chihuitan, Santa Efigenia); Tehuantepec City; October to January.

"Quite common on the two coasts. It frequents thin woods, shores of rivers, and lives upon rats, birds, and insects."

228. Rupornis magnirostris var. **griscocauda,** Ridg., Proc. Bost. Soc. of Nat. Hist., xvi, 87.

"Tehuantepec (Chihuitan, Almoloya near Barrio, Santa Efigenia); May, October, November, and December.

"Iris bright orange-red; cere and feet yellow; bill bluish-ash; base of lower mandible greenish-yellow; feet yellow."

229. Geranospiza nigra (Du Bus).

"Tehuantepec (Santa Efigenia); June, 1871.

"Iris bright red; upper mandible black, plumbeous at base, lower mandible light plumbeous; cere black; feet orange.

"Common enough on both sides of Mexico. This beautiful hawk resembles in its colors the Urobitingas, and by the lightness of its shape the Micrasturs, whose characteristics for the most part it possesses. It never leaves the woods, where, gliding with rapidity among the thickets of vines, it gives chase to the small lizards, tree-frogs, insects, &c. It is bold enough, and will allow itself to be approached carefully, but if slightly wounded it takes to flight on the ground with the greatest rapidity."

230. Micrastur semitorquatus (Vieill.).

"Tehuantepec (Santa Efigenia); Tehuantepec City; April, July, and November.

"Iris dark brown; bill black; cere, lores, and orbits, olive-green; feet yellow.

"This species, as one might judge at first sight from the shortness of its wings and the length of its tarsi and tail, is a very bad navigator. It is found almost always in the midst of thickets in the interior of great woods, never in exposed places. The only use he makes of his wings is to fly from one tree to another. Different from most birds of prey, who seek for their victims sometimes wheeling, sometimes perched on the top of dead trees, this one rarely leaves the shelter of the thickest foliage. It has sometimes the habit of squatting along the branches like the *Caprimulgidæ*. In this position, it is easily seen by the hunter. Its voice is strong and its cry analogous to that of *Herpetotheres cachinnans;* resounding for a long distance, it sounds like the syllables *kā - hă - ā, kā - hă - hā*, given with the full strength of its voice. A popular prejudice makes the repetition of this cry an indication of a change of weather, whence the common name of *Llama-norte* is given to *M. brachypterus*, the name which it shares on the Pacific coast with *Herp. cachinnans*. The name which they bear in common on the Atlantic coast is that of *Vaquero*.

"The food of *M. brachypterus* is composed principally of reptiles and above all of saurians. Hidden in the foliage, he waits for the young iguanas, lizards, &c. The *Cyclures* with the pointed tail (*Ctenosaura acanthura et quinquecarinata*) seem to be favorite game for him; his gizzard and his stomach almost always contain the remains. He attacks, also, young birds and insects.

"Notwithstanding the delicacy of his appearance, he is endowed with remarkable tenacity of life. It is rare that the first shot kills him outright. If, wounded in the wing, he falls to the ground, he flutters away

at so rapid a rate that a dog can scarcely follow him; and if he finds in his way a mass of dead branches, a hole, or a thicket of vines, he hides himself so well that it is difficult to find him.

"The young (of the first year?) are distinguished from the adults, not only by the plumage barred with black underneath, but also by the color of the bill. With the adults, this latter is black; with the young, it is of a greenish-olive, darker on the culmen; the cere and the lores are of a yellowish-green, and the feet of the young are of a more lively yellow. At all ages, the iris is of a reddish-brown."

231. Herpetotheres cachinnans (Linn.).

"Tehuantepec (Tapana); Tehuantepec City; October and December.

"Iris dark brown; bill blackish; cere yellowish; feet dull white.

"Dispersed on the two coasts of Mexico, this bird is known under the name of *Vaquero* at Vera Cruz and *Llama-norte* at Tehuantepec. It frequents with preference savannas, clearings, or the border of woods. Its large head, the custom that it has of ruffling its plumage when some object attracts its attention, and the grotesque gestures that it sometimes makes, give it a certain likeness in physiognomy to the owls. Its cry, which is very loud, is heard from a distance, and in the opinion of the natives forebodes the approach of rain or the north wind. Its food is principally composed of snakes, lizards, and grasshoppers."

232. Accipiter fuscus (Gm.).

"Tehuantepec (Santa Efigenia); Tehuantepec City; November and January.

"Iris reddish-orange; cere greenish-yellow; feet yellow."

233. Accipiter cooperi, Bp.

"Tehuantepec (Santa Efigenia)."

234. Buteo borealis (Gm.).

"Tehuantepec City; Cacoprieto; January, 1872.

"Iris clear yellowish-brown; cere olivaceous; bill plumbeous; tarsi clear yellowish-green."

235. Buteo pennsylvanicus (Wils.).

"Tehuantepec (Santa Efigenia); December, 1868.

"Iris hazel-brown; cere yellowish-green; feet yellow."

236. Buteo pterocles (Temm.).

"Tehuantepec (Tapana); July, 1869.

"Iris hazel-brown; cere greenish; feet yellow."

237. Buteo minutus, Pelz.

"Tehuantepec City; October, 1869.

"Iris brown; bill black, extreme base of both mandibles bluish; cere greenish-yellow; lores greenish; feet yellow."

238. Antenor unicinctus var. **harrisi** (Aud.)

"Tehuantepec City; October, 1869.

"Iris hazel-brown; cere, lores, and orbits yellow; bill light bluish-ash, tip dusky; feet orange-yellow."

239. Urubitinga zonura (Shaw).

"Tehuantepec (Santa Efigenia, Barrio); Tehuantepec City; Chiapas (Gineta Mountains); October to February.

"Iris brown; cere greenish-yellow; feet yellow."

240. Urubitinga anthracina (Licht.).

"Tehuantepec (Tapana, Santa Efigenia); December, January, February, and May.

"Iris brown; cere and lores greenish-yellow; feet yellow.

"These two species of *Urubitinga*, of habits almost analogous, are essentially river-birds, like the species of *Cymindis;* that is to say, they prefer the borders of rivers and of streams and wooded localities to all other places. In Mexico, they never leave warm and temperate latitudes, and even in the latter they are always rare. The kind of food is varied; being naturally voracious, they despise no living prey, and I have taken out of their stomachs small quadrupeds, young birds, reptiles, crustacea, and insects. They are fond of fish, and on the borders of shallow brooks they easily catch the smaller kinds. When they are at rest, their appearance is heavy and resembles that of the buzzards, but on the wing their flight is easy and graceful. On fine days, they can be seen wheeling at a great height, sometimes together, describing large circles and giving out sharp cries from time to time. On the ground, they are not wild and are easily approached. They make their nest, coarsely formed of small sticks, at the forks of the branches of the highest trees. Toward the 15th of April I have found the young, recently fledged and covered with a white down."

241. Cymindis cayennensis (Gm.).

"Tehuantepec (Santa Efigenia); April, 1871.

"Iris brown; upper mandible black, the lower, cere, lores, eyelids, and feet bluish-ash, the cere spotted with black.

"This bird prefers the forest for its dwelling above all other places, but it goes almost always near seas and rivers. It is evidently a resident of Central Mexico, for toward the middle of May of this year 1871) I killed a female, whose ovary contained eggs developed enough to lead one to believe that they were just ready to be laid. It gives preference to trees of the thickest foliage; it is rarely seen on naked branches. Very fond of mollusks, like others of his tribe, he hunts often on the ground and on the damp soil of forests bordering the sea, or the sides of brooks, searching for gastropods, either of land or water. From this habit, his bill, his feet, and his feathers are often much soiled."

242. Cymindis uncinatus (Ill.).

"Tehuantepec (Chihuitan, Santa Efigenia); January and May.

"Iris white; cere and lores green; spot below nostril and the eye yellow; feet orange-yellow.

"Notwithstanding the great difference of plumage between the old and young of this species, their identity is easily recognized, in a fresh state, by the beautiful yellow appearance of the naked skin between the eye and the bill. The habits of this species are almost identical with those of *C. cayenensis;* that is to say, that they prefer the woods in the vicinity of water. Its food is composed principally of mollusks, and I have found their stomachs almost always full of the remains of a large species of *Orthaticus*, a land gastropod very abundant in the woods of Western Mexico."

243. Ictinia plumbea (Gm.).

"Tehuantepec (Chimalapa); March, 1869.

"Iris brown; bill horny; feet brownish.

"It comes from Chimalapa, where, as on the coast of Vera Cruz, it is only a bird of passage. I observed a few years ago, near San Andres, Ticatla, several bands or companies of these birds traveling toward the north."

244. Circus Cyaneus var. **hudsonius** (Linn.).

"Tehuantepec City; winter."

245. Polyborus tharus var. **audubonii,** Cass.

"Partout universel."

Fam. CATHARTIDÆ.

246. Cathartes papa (Linn.).

"Partout universel."

247. Rhynogryphus aura (Linn.).

"Partout universel."

248. Catharista atrata (Bartr.).

"Partout universel."

Fam. COLUMBIDÆ.

249. Columba flavirostris, Wagl.

"Tehuantepec (Tapana); December, 1868.

"Iris reddish-orange; orbits and feet carmine; bill whitish, base rosy-red.

"Common at the foot of the Gineta Mountains, Santa Efigenia Tapana, &c. Perches always on the highest trees."

250. Zenaidura carolinensis (Linn.).

"Chiapas (Gineta Mountains); January, 1869."

251. Chæmepelia passerina (Linn.).

"Tehuantepec City; November, 1869.

"Iris light brown; bill dull carmine, tip dusky; feet light fleshy."

252. Scardafella inca (Less.).

"Tehuantepec City; October, 1869.

"Iris bright red; bill black; feet carmine."

253. Melopelia leucoptera (Linn.).

"Tehuantepec City; October, 1869.

"Iris orange; orbital skin bluish; bill black; feet dark carmine."

254. Leptoptila albifrons, Bp.

"Tehuantepec (Santa Efigenia); Tehuantepec City; October and January.

"Iris orange; bill black; orbital naked skin bluish; feet carmine.

"Quite common in the west of the isthmus: frequents the woods with preference; perches little, and goes almost always in pairs."

Fam. CRACIDÆ.

255. Crax globicera (Linn.).

"Tehuantepec (Tapana); June, 1869.

"Iris brown; feet ashy; cere yellow.

"Known throughout Mexico under the name of pheasant. It only frequents the forests, and is seen only alone and in pairs."

256. Penelope purpurascens, Wagl.

"Tehuantepec (Santa Efigenia); December, 1868.

"Iris, lower part of gular skin, and acrotarsus carmine-red; upper part of gular skin, orbital, and loral skin violaceous-black; bill black.

"Common name *Pava* at Tehuantepec, *Faison griton* or *Cajolite* at Vera Cruz. Abundant in all the thick woods of the isthmus. It goes generally in small flocks. It is good game, and the flesh is less dry and more savory than that of the Hocco. Its bones, it is said, give attacks of epilepsy to the dogs who have eaten them, and even kill them. Like the Hocco, the Pava is easily tamed."

257. Ortalida poliocephala, Wagl.)

"Tehuantepec (Tapana, Barrio); Tehuantepec City; April, September, and November.

"Iris hazel-brown; orbits and gular skin carmine; bill light plumbeous; feet ashy.

"This species belongs properly to the coast of the Pacific, where it bears, as elsewhere, the name of *Chachalaca*. Is abundant everywhere."

258. Ortalida vetula, Wagl.

"Tehuantepec (Guichicovi); September, 1869.

"Iris brown; gular naked skin carmine; bill and feet bluish-ash.

"This species is more abundant on the eastern coast of the isthmus."

Fam. PERDICIDÆ.

259. Ortyx coyolcos, Gm.

"Tehuantepec (Tapana, Santa Efigenia); May, June, and December.

"Iris brown; upper mandible brownish, lower lighter; feet light brownish-gray.

"Common in all the plains on the west of the isthmus, where it is called *Codorniz*. It alights sometimes in trees when pursued."

Fam. CRYPTURIDÆ.

260. Nothocercus sallæi, Bp.

"Tehuantepec (Santa Efigenia); December, 1868.

"Iris hazel-brown; upper mandible brownish, lower pale; feet red.

"Killed near Santa Efigenia. It never appears in the plains."

Fam. CHARADRIIDÆ.

261. Œdicnemus bistriatus, Wagl.

"Tehuantepec (Tapana); December, 1868.

"Iris greenish-yellow; bill black, base of lower mandible yellowish-green; feet pale-greenish."

262. Sqatarola helvetica (Linn.).

"Tehuantepec (San Mateo); February, 1869.

"Iris dark brown; bill black; feet dark ashy."

263. Ægialitis vocifera (Linn.).

"Tehuantepec (Santa Efigenia); January, 1869."

264. Ægialitis semipalmata (Bp.).

"Tehuantepec (San Mateo); August and February.

"Iris dark brown; bill black, extreme base orange; feet dull yellowish."

265. Ægialitis collaris (Vieill.).

"Tehuantepec City; October and November.

"Iris dark brown; bill black, extreme base of lower mandible fleshy; feet light flesh-color."

Fam. HÆMATOPIDÆ.

266. Hæmatopus palliatus, Temm.

"Tehuantepec (San Mateo, San Francisco); February and April.

"Iris chrome-yellow; bill and orbits bright coral-red; feet pale flesh-color."

267. Strepsilas interpres (Linn.).

"Tehuantepec (San Mateo); August, 1869.

"Iris brown; bill black; feet orange-red."

Fam. RECURVIROSTRIDÆ.

268. Himantopus nigricollis, Vieill.

"Tehuantepec (San Mateo); August, 1869.

"Iris carmine-red; bill black; feet light carmine."

Fam. PHALAROPIDÆ.

269. Lobipes hyperboreus (Linn.).

"Tehuantepec (Ventosa); October, 1869.

"Iris dark brown; bill black; feet dark plumbeous."

Fam. SCOLOPACIDÆ.

270. Macrorhamphus griseus var. **scolopaceus** (Say.).

"Tehuantepec (San Mateo); August and February, 1869.

"Iris dark brown; bill dull olivaceous, greenish at the base; feet greenish."

271. Micropalama himantopus, Bp.

"Tehuantepec (San Mateo); February, 1869.

"Iris brown; bill black; feet yellowish-olive."

272. Ereunetes pusillus var. **occidentalis,** Lawr.

"Tehuantepec (San Mateo); Tehuantepec City; August, October, and February.

"Iris dark brown; bill black; feet dark olivaceous (nearly black)."

273. Actodromas minutilla (Vieill.).

"Tehuantepec City; October, 1869.

"Iris dark brown; bill black, its extreme base and feet greenish."

274. Actodromas maculata (Vieill.).

"Tehuantepec City; October, 1869.

"Iris brown; bill blackish, dirty yellowish-green at base; feet dull yellowish-green."

275. Calidris arenaria (Linn.).

"Tehuantepec (San Mateo); August and February.

"Iris brown; bill black; feet dark olivaceous (nearly black)."

276. Limosa fedoa (Linn.).

"Tehuantepec (San Mateo); August and February.

"Iris brown; basal half of bill flesh-colored, apical half dusky; feet dark ashy."

277. Symphemia semipalmata (Gm.).

"Tehuantepec (San Mateo).

"Iris brown; bill blackish, at the base grayish; feet ashy."

278. Gambetta melanoleuca (Gm.).

"Tehuantepec (San Mateo); February, 1869.

"Iris brown; basal half of bill grayish, terminal half dusky; feet yellow."

279. Gambetta flavipes (Gm.).

"Tehuantepec (San Mateo); February, 1869.

"Iris brown; bill black; feet yellow."

280. Rhyacophilus solitarius (Wils.).

"Tehuantepec (Tapana); Tehuantepec City; October and April.

"Iris dark brown; terminal half of bill black, basal half greenish; feet light olivaceous-green."

281. Tringoides macularius (Linn.).

"Tehuantepec (San Mateo, Santa Efigenia); Tehuantepec City; August, October, and December."

282. Numenius longirostris, Wils.

"Tehuantepec (Juchitan); December, 1868.

"Iris brown; upper mandible blackish-brown, lower mandible lighter; feet ashy."

283. Numenius hudsonicus, Latham.

"Tehuantepec (Ventosa Bay); December, 1869.

"Iris brown; bill black, basal half of under mandible fleshy; feet ashy."

Fam. TANTALIDÆ.

284. Tantalus loculator, Linn.

"Tehuantepec (Santa Efigenia); December, 1868."

285. Ibis alba, Linn.

"Tehuantepec (San Mateo); August, 1869.

"Iris light-blue; naked skin of face fleshy-red; bill and feet fleshy."

Fam. CANCROMIDÆ.

286. Cancroma cochlearia, Linn.

"Tehuantepec (Santa Efigenia); December and January."

Fam. PLATALEIDÆ.

287. Platalea ajaja, Linn.

"Tehuantepec (Santa Efigenia); February, 1869.

"Iris and feet carmine-red."

Fam. ARDEIDÆ.

288. Ardea herodias, Linn.

"Tehuantepec City."

289. Garzetta candidissima (Gm.).

"Tehuantepec (Santa Efigenia); Oaxaca; August and December.

"Iris yellow; bill black; basal half of lower mandible light-bluish; extreme base of upper mandible and lores orange-yellow; tarsi black; toes yellow."

290. Demiegretta leucogastra var. **leucoprymna** (Licht.).

"Tehuantepec City; October, 1869.

"Iris straw-yellow; lores yellow; upper mandible black, lower clay-yellow; feet green."

291. Demiegretta rufa (Bodd.).

"Tehuantepec (San Mateo); August, 1869.

"Iris yellow; bill blackish, grayish at the base; feet black."

292. Demiegretta pealei, Bp.

"Tehuantepec City; October, 1869.

"Iris yellowish-white; lores light-yellow; bill fleshy, along culmen and at tip black; feet black."

293. Florida cærulea (Linn.).

"Tehuantepec (Santa Efigenia)."

294. Butorides virescens (Linn.).

"Tehuantepec (Barrio, Santa Efigenia); Tehuantepec City; October and December.

"Iris yellow; lores, orbits, and nearly all the lower mandible yellow; upper mandible brownish-black; feet olive-green."

295. Nyctiardea grisea var. **nævia** (Bodd.).

"Tehuantepec City; November, 1869.

"Iris red; upper mandible and tip of lower black; lores, most of lower mandible, and feet greenish."

296. Ardetta exilis (Gm.).

"Tehuantepec City; October, 1869.

"Iris light straw-yellow; bill yellowish, except upper surface of upper mandible, which is blackish; upper surface of tarsus and toes greenish, under surface yellow."

297. Tigrisoma cabinisi, Heine.

"Tehuantepec (Tapana, Chihuitan, Santa Efigenia); Tehuantepec City; Venta Salada (Puebla); April, August, October, and February.

"Iris yellow; orbits, lores, gular sac, and feet greenish; upper mandible black, lower greenish-yellow."

Fam. RALLIDÆ.

298. Aramus scolopaceus var. **giganteus,** Bp.

"Tehuantepec (Santa Efigenia); February, 1869."

299. Aramides albiventris, Lawr.

"Tehuantepec (San Francisco); April, 1869.

"Iris reddish; basal half of bill reddish, terminal half greenish; feet carmine."

300. Gallinula galeata, Licht.

"Tehuantepec City; November, 1869.

"Iris brown; frontal plate and bill dark brownish-olive; apical third of bill olive-green; feet greenish."

301. Fulica americana, Gm.

"San Mateo."

Fam. PARRIDÆ.

302. Parra gymnostoma, Wagl.

"Tehuantepec (Santa Efigenia, Zonatepec); March and April.

"Iris dark-brown; bill, alar spurs, and frontal leaf bright-yellow; upper base of bill bluish-white, the space between it and the nasal leaf dark-carmine; feet greenish."

Fam. ANATIDÆ.

303. Dendrocygna autumnalis (Linn.).

"Tehuantepec (Tapana); June, 1869.

"Iris brown; bill bright-fleshy, tinged with yellow near the nostrils; feet light-fleshy."

304. Cairina moschata (Linn.).

"Tehuantepec (Tapana, Santa Efigenia); March, May, and December.

"Iris clear chestnut-brown; bill bluish-white, with transverse black spots; nasal caruncle and sides of head black; caruncles carmine-red; feet black."

Fam. PELECANIDÆ.

305. Pelecanus fuscus, Linn.

"Ventosa Bay."

306. Pelecanus erythrorhynchus, Gm.

"Tehuantepec (San Mateo)."

Fam. GRACULIDÆ.

307. Graculus mexicanus, Brandt.

"Tehuantepec (Santa Efigenia); December, 1868.

"Iris green; bill dark-fleshy; culmen and tomia dusky; gular sac brownish; feet deep-black."

Fam. PLOTIDÆ.

308. Plotus anhinga, Linn.

"*Tehuantepec* (Santa Efigenia); December, 1868."

Fam. TACHYPETIDÆ.

309. Tachypetes aquilus (Linn.).

"Tehuantepec (Ventosa Bay); November, 1869.

"Iris dark-brown; orbits and gular skin dark-plumbeous, with a tinge of violaceous; feet carmine."

Fam. LARIDÆ.

310. Larus delawarensis, Ord.

"Tehuantepec; February and March."

311. Larus californicus, Lawr.

"Tehuantepec (San Mateo); February, 1869.

"Iris hazel-brown; bill grayish-white, behind the yellowish-white tip a black vitta; feet dull greenish-white."

312. Chroicocephalus atricilla (Linn.).

"Tehuantepec (Juchitan, Ventosa, San Mateo); February, August, November, and December.

"Iris dark-brown; bill and feet reddish, tip of bill bright-red, preceded by a dusky spot or vitta; inside of mouth light-sanguine."

313. Gelochelidon anglica (Montagu).

"Tehuantepec (San Mateo); August and February.

"Iris dark-brown; bill black; feet brownish-black."

314. Thalasseus maximus (Bodd.).

"Tehuantepec (San Mateo); August and February.

"Iris dark-brown; bill bright orange-red; feet dark-brown; under surface of toes brownish-yellow."

315. Thalasseus cantiacus (Gm.).

"Tehuantepec (San Mateo); August and February.

"Iris dark-brown; bill black, with the tip yellow; feet dark-brown; under surface of toes yellowish."

316. Sterna forsteri, Nutt.

"Tehuantepec (San Mateo, Ventosa Bay); December and February.

"Iris dark-brown; bill black, its extreme tip whitish; feet dark-orange."

317. Sterna dougalli, Mont.

"Tehuantepec (Ventosa Bay)."

318. Sterna antillarum, Less.

"Tehuantepec (San Mateo); August, 1869.

"Iris dark-brown; bill yellow, tip dusky; feet dull orange-yellow."

319. Hydrochelidon fissipes (Linn.).

"Tehuantepec (San Mateo); August, 1869.

"Iris dark-brown; bill black; feet dark-brown."

320. Rhynchops nigra, Linn.

"Tehuantepec (San Mateo); August, 1869.

"Iris brown; basal half of bill coral-red, terminal half black; feet coral-red."

Fam. PODICIPIDÆ.

321. Sylbeocyclus dominicus (Linn.).

"Tehuantepec (Juchitan); September, 1868.

"Iris orange; bill black, tip whitish; feet black, tinged with grayish."

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Department of the Interior:

U. S. NATIONAL MUSEUM.

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This work is the fifth of a series of papers intended to illustrate the collections of Natural History and Ethnology belonging to the United States and constituting the National Museum, of which the Smithsonian Institution was placed in charge by the act of Congress of August 10, 1846.

It has been prepared at the request of the Institution, and printed by authority of the honorable Secretary of the Interior.

JOSEPH HENRY,
Secretary Smithsonian Institution.

SMITHSONIAN INSTITUTION,
Washington, November, 1875.

CATALOGUE

OF THE

FISHES OF THE BERMUDAS.

BASED CHIEFLY UPON THE COLLECTIONS OF THE UNITED STATES NATIONAL MUSEUM.

By G. BROWN GOODE, M. A.

ASSISTANT CURATOR U. S. NATIONAL MUSEUM.

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1876.

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INTRODUCTORY REMARKS.

A visit to the Bermudas during the months of February and March, 1872, afforded opportunities for collecting the notes and specimens upon which the present paper is based. The enumeration of species here attempted, although necessarily far from exhaustive, is believed to indicate, with some degree of accuracy, the character of the ichthyological fauna of the group; and it is hoped that this list, with its annotations, may not be without interest as a contribution to geographical zoology. Surprisingly little has been done by naturalists in the investigation of the marine life of this region, interesting as it is likely to prove on account of its isolated, mid-atlantic position, the peculiarities of its climate, and its proximity to the Gulf Stream, rendering so easy observations upon the influence of ocean-currents in the distribution of living forms. The ichthyologist finds here the best of opportunities for the study of pelagic and migratory species. A broad field lies before some resident naturalist who will do for the ichthyology of the Bermudas what Poey and Bleeker have done and are doing for that of the East and West Indies. Comparatively little could be done in two months, least of all in winter and early spring, when stormy weather rendered explorations of the reefs impracticable, and often prevented the fishermen from leaving their moorings in the harbors. At the time of my visit, only seven species of fishes had been recorded from this locality; and the only authentic information regarding the fish-fauna was contained in one chapter, which was unfortunately very short, of Mr. Jones's admirable little work,* the author at that time not having turned his attention to the study of this class. The list given by Godet† should

*The Naturalist in Bermuda; a sketch of the geology, zoology, and botany of that remarkable group of islands; together with meteorological observations. By John Matthew Jones, esq. (of the Middle Temple), assisted by Maj. J. W. Wedderburn (late 42nd Roy. Highlanders) and J. L. Hurdis, esq.—With a map and illustrations.—"Every kingdom, every province, should have its own monographer."—Gilbert White. London: Reeve & Turner, 238, Strand.—1859. 12mo, pp. xii, 200.

†Bermuda, its History, Geology, Climate, Products, Agriculture, Commerce, and Government. By T. L. Godet. London, 1860. 12mo.

be ignored, as it is taken almost bodily from Gosse's "Naturalist in Jamaica."

In the present list, I enumerate seventy-five species, most of which were personally observed; for convenience of reference, all species known to occur in this locality have been included. In working up my notes, I have endeavored to supplement previous descriptions by (1) descriptions of the colors of the fishes *while living*, (2) notes on size and proportions, (3) observations on habits, (4) hints in reference to the origin and meaning of their popular names, (5) notes upon modes of capture and economic value. The meaning of the specific names employed has been defined by partial synonymies, to which critical notes are occasionally appended. To make the list a more complete contribution to chorological knowledge, a brief note has been given upon the geographical distribution of each species.

The scheme of classification proposed by Professor Gill * has been followed throughout. I am indebted to Professor Gill for valuable suggestions and the identification of two or three of the more doubtful species.

TOPOGRAPHY OF THE ISLANDS.

The general topography of the Bermudas is so well known that no detailed account will be necessary. It may not be out of place, how-

* Arrangement of the Families of Fishes or Classes Pisces, Marsipobranchii, and Leptocardii. Prepared for the Smithsonian Institution by Theodore Gill, M. D., Ph. D. Washington: published by the Smithsonian Institution, November, 1872. 8vo, pp. xlvi, 50. (Smithsonian Miscellaneous Collections, 247.)

Catalogue of the Fishes of the East Coast of North America, by Theodore Gill. < Report on the Condition of the Sea Fisheries of the South Coast of New England in 1871 and 1872, by Spencer F. Baird, Commissioner, &c. pp. 779–822.

Catalogue of the Fishes of the East Coast of North America, by Theodore Gill, M. D. Ph. D. Washington. Published by the Smithsonian Institution, 1873. 8vo, pp. 50. (Smithsonian Miscellaneous Collections, 283.—A reprint of the preceding).

On the Limits of the Class of Fishes. By Theodore Gill, M. D., Ph. D. < American Naturalist, vol. vii, pp. 71–77, February, 1873. (Reprinted with repagination, 8vo, pp. 9; no title-page.)

The Number of Classes of Vertebrates and their Mutual Relations, By Prof. Thedore Gill. (Abstract of a Communication to the National Academy of Sciences, made October 29, 1873.) < American Journal of Science and Arts, vi, December, 1873, pp. 432–436. Reprinted with repagination, 8vo, pp. 4; no title-page;) also reprinted Annals and Magazine of Natural History, (London,) xiii, pp. 71–73, Jan. 1874.

Article *Fish* and descriptions of the various families, prepared by Professor Gill, as associate editor in the department of zoology, &c. < Johnson's New Universal Cyclopædia and Popular Treasury of Useful Knowledge. * * * A. J. Johnson & Son, New York.

ever, to refer to those features which bear more particularly upon the homes of the fishes. The sunken atoll, which is the foundation of the group, is shaped like an ellipse, its major axis twenty-five miles in length, its minor axis thirteen. The major axis runs in a northeast and southwest direction, the chain of main islands lying on the southeast edge of the ellipse, and forming a nearly continuous line twenty-six miles long, the lower or western end curving, nearly in the shape of a shepherd's crook or a fish-hook, to the southernmost focus of the supposed curve. The main islands, five in number, are separated by narrow channels, fifteen or twenty feet in depth, and their shores are deeply indented by shallow bays and lagoons. The reef, which approaches within a few hundred yards of the shore of the main islands on the south, is distant on the north and northwest from five to nine miles; the intervening space is crossed and recrossed by submerged reefs and ledges of coral limestone, and dotted in the neighborhood of the main islands by smaller islands and emerging ledges to the number of three hundred or more. The harbors are not particularly calm, but there are many broad bays whose surface the severest storms scarcely ripple. Within the encircling reef the depth of water rarely exceeds twelve and fourteen fathoms, while beyond this reef the bottom rapidly slopes to the level of the Atlantic bottom. Twenty miles to the southwest by west are two or three ledges, to which the fishermen resort for line-fishing in fine weather.

FISHERIES AND FISH-MARKETS.

The Bermudian fisheries have always been famous. A large number of the poorer islanders, particularly the negroes, are professional fishermen, and are bold and skillful sailors, though their ambition only suffices to keep them at work when purse and larder show signs of exhaustion. Every cottage has its little garden, where bananas and sweet-potatoes grow for the trouble of planting, so that the fishermen are not entirely dependent upon their occupation for support, and the supply of fish often falls far short of the demand, and this is especially the case in the winter, when the landing of a boat is the signal for a general rush to the shore. The people of Bermuda, over twelve thousand in number, are dependent chiefly upon the fisheries for their animal food. Large shipments of cattle and sheep are received from the United States, but these are monopolized by the wealthier classes and by the garrison, so that their flesh rarely finds its way to the tables of the negroes, who number over seven thousand, or of the poorer white colonists, who constitute more than *one-half of the* remaining population.

The fishing-boats are built in the English style, drawing five or six feet of water, deep-keeled, sloop or schooner rigged, and usually provided with a large well in the hold, in which the fish are brought in alive.

The only market is the water's edge. In the large towns, Hamilton and St. George's, the quay is lined nearly every morning at sunrise by a long row of fish-boats. The fish swim in the wells until customers are found for them; when one is selected, it is taken up in a landing-net or by a gaff-hook, and quickly killed by thrusting a sharp awl into the base of the brain; it is then bled, skinned (rarely scaled), eviscerated, and delivered into the hands of the purchaser, a loop of palmetto fiber always being attached for convenience in carrying. At an early hour the fares are disposed of, and the boats are under weigh for the fishing-grounds. At almost any time, however, row-boats filled with small seined fish may be found at the quay. Those who live in the country-parishes watch the return of their neighbors' boats at night-fall, and thus secure their supplies of fish.

Fish from such a market cannot fail to be fresh, and the excellence of the Bermuda food-fishes is due to this, and to the fact that they are never allowed to die of suffocation in the air, but are killed quickly and bled. The Angel-fish (*Holacanthus ciliaris*) is perhaps the most highly esteemed; next in rank are the various species of *Pristipomatidæ*, *Serranidæ*, and *Sparidæ*, with the Hog-fish (*Lachnolæmus falcatus*). All others are regarded inferior in quality. The price of fish is fixed by law at fourpence a pound, an advance of one penny having been made within a few years.

Most of the line-fishing is done among the outer reefs or on the outer banks, twenty miles distant. The favorite baits are the flesh of the "Bermuda lobster" (*Palinurus americanus*) and the "Spanish lobster" (*Scyllarus æquinoxialis*), and that of some of the larger fishes, such as the "Mackerel" (*Orcynus alliteratus*), and the Morays (*Muræniдæ*). The Pilchard (*Harengula macrophthalma*), Shad (*Eucinostomus gula* and *E. Lefroyi*), and the Robin (*Decapterus punctatus*), are used as "full-baits," as are also the various kinds of "fry" (*Atherina* and *Engraulis* sp.). The "Scuttle," a large *Octopus*, very common on the reefs, is also frequently used, its toughness making it a very lasting bait. Many of the choicest and largest species, such as the *Pristipomatidæ*, *Serranidæ*, and *Scombridæ*, are taken exclusively with lines.

The *Sparidæ*, *Labridæ*, *Scaridæ*, the smaller *Serranidæ*, and many others, with great quantities of the large crustaceans so much in demand for bait, are captured in basket-work fish-pots constructed of split cane.

These are built on the same principle with the lobster-pots in use on the New England coast, but are very peculiar in shape. A fair idea of one of them may be gained by imagining two crockery-crates placed together, with the ends at an angle so as to form a very thick capital letter V, with arms about four feet square, the entrance being through a funnel-shaped aperture placed in the inner angle. Smaller and more portable pots, made after the same model in annealed wire, are also in use. Such pots are baited with fish or lobsters, and anchored in two or three fathoms of water.

Shallow seines, a hundred yards or so in length, are plied in the bays, and with them are taken vast numbers of the smaller school-fishes, such as *Sargus variegatus*, *Pimelepterus Boscii*, *Mugil liza*, *Eucinostomus gula*, *Eucinostomus Lefroyi*, *Hemirhamphus Pleii*, *Decapterus punctatus*, &c. These seines are usually tanned with the bark of the mangrove-tree, (*Rhizophora mangle.*)

Circular casting-nets, ten feet in diameter, are used with much dexterity in capturing small fish for bait.

The "grains," a heavy, two-pronged instrument, resembling an ordinary fish-spear or gig, is carried in every boat, and used in striking large fish. The skillful grainsman seldom misses his mark, and in these waters, clear as crystal, this instrument is effective at the depth of ten or twelve feet.

During the winter months, recourse is had to the fish-ponds, which are stocked with the surplus of the summer's catch. These are of simple construction, usually natural pools in the rocks, or protected coves, inclosed by loosely-laid stone walls. Hundreds, sometimes thousands, of large fishes are here stored up for seasons when the severity of the weather is such as to prevent the usual visits to the fishing-grounds. The largest of these, the "Devil's Hole," on Harrington Sound, is visited by almost all the strangers on the islands, a small fee being charged for the privilege of seeing the fishes feed. Several hundred large Groupers and Hamlets (*Epinephelus striatus*) are usually confined here; and, when bait is thrown into the pond, the visitor can see only a close array of widely-stretched hungry mouths, each six or eight inches in diameter.

THE RELATIONS OF THE BERMUDIAN FISH-FAUNA.

These islands, considered in reference to their marine fauna, lie on the extreme northern and eastern boundary of the West Indian "Region." All the more characteristic fishes of this "Region" are represented in Bermudian waters, and the invertebrate fauna, as far

as investigated, appears to have very similar relations. The reef-building polyps find here their farthest northern remove from the equator. That the subtropical character of the marine fauna and flora is determined to a great extent by the influence of the Gulf Stream is rendered very evident by comparing the life on the land with that of the surrounding waters. The latter is much the more tropical and West Indian in character; while the former, although many West Indian species are represented in the flora, is a curious assemblage of forms brought together from various quarters by winds, ocean-currents, and the agency of man. Drift-wood and seeds from the Antilles are cast up in great quantities with the flotsam and jetsam of the shore, and many of the commonest plants of the Bermudas are supposed to have found their way thither in this manner. Thus the transporting power of the Gulf Stream appears to have been quite as important in the introduction of tropical forms of life to this group as has been its thermal effect in rendering it a suitable home for them. Since the Bermuda atoll is comparatively recent in origin, it is not difficult to believe that it has thus been supplied with living forms. Many fishes of the West Indian fauna have been found in the waters of the Azores, Canaries, Madeira, the Cape Verde Islands, and other points in the Eastern Atlantic; it appears easy to account for their wanderings by an extension of the action of the same transporting agent.

The occurrence of several strictly European species is also to be noted. All of these appear to be powerful, rapid swimmers, with the exception, perhaps, of *Synodus lacerta*.

The subjoined tables are intended to exhibit the geographical relations of the fishes observed in Bermudian waters. Several of the species mentioned in the paper are not included, since confusion in their synonymy has rendered their limits of distribution doubtful.

The total number of species enumerated is 75. Of these, 18 are so widely distributed as to be of little importance in a comparison of this nature. Of the 57 remaining, 50, or 86 per cent. (68, or 89 per cent. of the whole number, 75), are common to the Bermudas and the West Indies; 18 species, or 32 per cent. of the whole, or 37 per cent. of those common to the two faunas compared above, occur on the coast of Brazil, only 2, however, south of Bahia; 8 species, or 14 per cent., are found on the eastern coast of the United States north of Georgia; 4 of these are undoubtedly accidental there, while 2, *Decapterus punctatus* and *Paratractus pisquetus*, have a range along the coast from Rio de Janeiro to *Cape Cod*, and the seventh, *Anguilla bostoniensis*, is not sufficiently

established in its specific relations to warrant generalizations; 13 species, or 23 per cent., occur in the Eastern Atlantic; 3 of these have not been recorded west of the Bermudas, and I prefer for the present to consider them as wanderers from the Mediterranean fauna. The relations, faunally, of others, such as *Balistes capriscus* and *Pimelepterus Boscii*, are somewhat problematical.

Four species of marine fishes and one inhabiting brackish water are known to be peculiar to the group.

Species common to the Bermudas and West Indies.

Ostracium triquetrum.
Pseudoscarus superbus.
Pseudoscarus cœruleus.
Chœrojulis radiatus.
Lachnolæmus falcatus.
Eucinostomus Lefroyi.
Acanthurus cœruleus.
Sarothrodus bimaculatus.
Calamus megacephalus.
Calamus orbitarius.
Lutjanus caxis.
Mesoprion aya.
Trisotropis guttatus.
Epinephelus striatus.
Epinephelus guttatus.
Hypoplectrus puella.
Mugil liza.
Anostoma coloratum.
Hemirhamphus Pleii.
Exocœtus exiliens.
Megalops thrissoides.
Sardinella anchovia.
Harengula macrophthalma.
Echidna catenata.
Zonichthys fasciatus (South Carolina).

Common to the Bermudas, West Indies, and Eastern Atlantic.

Chilomycterus reticulatus (Saint Helena).
Chilichthys Spengleri (Madeira, Cape Verdes, and Western Africa).
Ostracium quadricorne (Saint Helena, Western Africa, Cape of Good Hope).
Sphyræna picuda (river Niger).

Common to the Bermudas, Brazil, Cape Verdes, and Ascension Island.

Salarias textilis.

Common to the Bermudas, West Indies, and Northern Brazil.

Malthe vespertilio.
Scarus radians.
Eucinostomus gula.
Hypeneus maculatus (Rio de Janeiro).
Holocentrum *sogo*.
Pareques punctatus.
Hæmylum capeuna.
Hæmylum chrysopterum.
Trisotropis undulosus.
Hemirhamphus Pleii.

Common to the Bermudas, West Indies, Brazil, and the Eastern Atlantic.

Labrosomus nuchipinnis (Gorea).
Harpe rufus (Saint Helena, Rio de Janeiro).
Glyphidodon saxatilis (Cape Verde Islands; accidental in New England).
Enneacentrus punctatus (Cape Verde Islands).
Gymnothorax moringa (Saint Helena).

Common to the Bermudas, West Indies, Brazil, and the east coast of the United States.

Acanthurus nigricans (South Carolina).
Decapterus punctatus.
Paratractus pisquetus.

Common to the Western Atlantic and Western Pacific??

Anguilla bostoniensis.

Common to the Bermudas, Mediterranean, and Eastern Atlantic.

Sargus variegatus (Madeira).
Sphyræna spet (Canaries).
Synodus lacerta (Madeira).

Common to the Bermudas, West Indies, Madeira, and the Mediterranean.

Pimelepterus Boscii (accidental at New York).

Common to the Bermudas, West Indies, east coast of United States, Madeira, Mediterranean, and the Pacific.

Balistes capriscus.

Pelagic: Atlantic.

Hippocampus, sp.
Dactylopterus volitans (Mediterranean).
Exocœtus, sp.
Mustelus canis.
Isuropsis punctata.

Pelagic: both hemispheres.

Paradiodon hystrix.
Alutera scripta.
Antennarius marmoratus.
Trachurops crumenophthalmus.
Orcynus alliteratus.
* Naucrates ductor.
Coryphæna hippurus.
* Leptecheneis naucrates.
* Ptheirichthys lineatus.
Regalecus gladius.
* Sphyrna zygæna.
* Reniceps tiburo.

* Not personally observed.

Peculiar to the Bermudas.

ıus Jonesii.	Engraulis chœrostomus.
bermudensis.	Fundulus bermudæ.

Acclimated.

Carassius auratus.

POPULAR NAMES.

mes in use among the fishermen afford some curious studies. ·acticable, hints in regard to their origin have been given. rve that of the thirty-three names given by Catesby* as in use ıhamas at the time of his visit to those islands, one hundred years ago (1724–25), twenty-six are applied to common species ırmudas. Nearly all of these are applied to fishes of the same genus, and most of them to the same species. This may per- explained by the common origin of the colonists of the two It is an interesting instance of the persistency of common names. these names are in use at the present time in the southern States, though usually applied to different species.

ned is a list of names in use among the fishermen, to the appli- which I can give no clew:—

ɜ Squirrel.	Shad Porgy.	Sunburnt Shark.
ck.	Scotch Porgy.	Rainbow.
ıuper.	Red-tail.	Thumper.
Hog-fish.	Bone-fish.	Mermaid.
ɔg-fish.	Grubble.	Skip-jack.
	Yellow Tang.	Slippery Dick.
	White Belly.	Prickly Hind.
	Blue Belly.	Sardine.
e Porgy.	Permit.	Sand Mullet.
ɔne Porgy.	Sand Shark.	

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tural History of Carolina, Florida and the Bahama Islands; containing The Birds, Beasts, Fishes, Serpents, Insects and Plants: Particularly the Forest- ıbs and other Plants not hitherto described or very incorrectly figured by Together with their Descriptions in English and French. To which are ıervations on the Air, Soil and Waters: With Remarks upon Agriculture, ıe, Roots, &c. To the Whole is Prefixed a new and correct Map of the Coun- ıed of. By MARK CATESBY, F. R. S. London * * * * MDCCCXXXI- vols. folio.

The English names given to the species in this paper are those which are commonly applied to them by the islanders, and no others are employed.

The following identifications of Catesby's species are suggested in connection with the plates of fishes given in the second volume. These conclusions were reached after a careful examination of the synonymy of the names here proposed as adopted by later writers, especially Linné, who appears to have founded several species upon these figures and descriptions. In many cases, comparative measurements have been made with these plates and the fishes they are supposed to represent, so as to make the identification as accurate as might be. A casual comparison will show the reader how closely the local names correspond to those in use in the Bermudas:—

T. 1. Umbla minor, marina, &c. (BARRACUDA) is *Sphyræna picuda.*
Vulpis Bahamensis is *Albula conorhynchus.*

T. 2. Perca marina gibbosa, &c. (THE MARGATE FISH) is (?) *Hæmylum chrysopterum.*
Saurus ex cinereo nigricans (THE SEA SPARROW HAWK) is *Synodus fœtens.*

T. 3. Perca marina, pinna dorsi divisa (THE CROKER) is *Micropogon undulatus.*
Perca marina rubra (THE SQUIRREL) is *Holocentrum sogo.*

T. 4. Perca marina rhomboidalis (THE PORK FISH) does not agree with *Lagodon rhomboides*, to which it has been referred. The figure is too indefinite for determination and does not agree with the author's description.
Perca marina pinnis branchialibus carens (THE SCHOOLMASTER) is equally indefinite; the pectoral fins were evidently an afterthought of the artist.

T. 5. Perca marina venenosa, &c. (THE ROCK FISH) is *Trisotropis guttatus*, or some allied species.

T. 6. Perca marina capite striato (THE GRUNT) is some species of *Hæmylum*, perhaps *H. arcuatum.*
Albula bahamensis (THE MULLET) is *Mugil* sp.

T. 7. Perca marina puncticulata (THE NEGRO FISH) is *Enneacentrus ouatalibi.*
Perca cauda nigra (THE BLACK-TAIL) is very like *Ocyurus chrysurus.*

T. 8. Hirundo (THE FLYING FISH) is unidentifiable, but is probably the common Barbados species, perhaps *Exocœtus Roberti*, M. & T.
Perca marina sectatrix (THE RUDDER FISH) cannot be recognized, but is probably one of the *Stromateidæ.*
Perca fluviatilis gibbosa ventre luteo (THE FRESH-WATER PEARCH) is *Pomotis vulgaris.*

T. 9. Turdus pinnis branchialibus carens (THE MANGROVE SNAPPER) is quite unrecognizable, the grotesque figure without pectoral fins being evidently imaginary.

T. 10. Turdus rhomboidalis (THE TANG) is *Acanthurus nigricans.*
Turdus cauda convexa (THE YELLOW FISH) is probably *Enneacentrus ouatclibi.* *Compare* T. 7, *supra.*

T. 11. Turdus flavus (THE HOG FISH) is perhaps *Harpe rufus;* is certainly a Labroid.
Turdus cinereus peltatus (THE SHAD) is a *Eucinostomus*, and closely resembles the new Bermuda species *E. Lefroyi.*

T. 12. Turdus oculo radiato (THE PUDDING-WIFE) is a young specimen of *Chærojulis radiatus.*
Alburnus americanus (THE CAROLINA WHITING) is clearly *Menticirrus alburnus*, with which its shape and the barbels on the chin would place it, in spite of the manifest omission of the second dorsal fin.

T. 13. Mormyrus ex cinereo nigricans (THE BONE-FISH) I am unable to identify, though the name is in use at the present day in the Bahamas.

T. 14. Cugupuguacu Brazil (THE HIND) is *Epinephelus guttatus.*
Saltatrix (SKIPJACK) is *Pomatomus saltatrix.*

T. 15. Suillus (THE GREAT HOG-FISH) is *Lachnolæmus falcatus.*

T. 16. Aurata Bahamensis (THE PORGY) is probably *Chrysophrys auratus* or *C. orbitarius.*

T. 17. Salpa purpurescens variegata (THE LANE SNAPPER) I cannot place.
Petimbuabo Brazil (THE TOBACCOPIPE-FISH) is *Fistulari tabaccaria.*

T. 18. Novacula cœrulea (THE BLUE-FISH) is *Pseudoscarus cœruleus.*

T. 19. Unicornis, Piscis Bahamensis (THE BAHAMA UNICORN-FISH) is *Alutera scripta.*

T. 20. Muræna maculatus, nigra et viridis (THE MURAY) closely resembles *Gymnothorax rostratus.*

T. 21. Muræna maculata nigra (THE BLACK MURAY) is not clearly identified.

T. 22. Turdus oculo radiato (THE OLD WIFE) is *Balistes vetula.*

T. 23. Bagre, &c. (THE CAT-FISH) somewhat resembles *Noturus flavus.*

T. 24. Harengus minor Bahamensis (THE PILCHARD) is some small Clupeoid.

T. 25. Anthea quartus, Rondeletii (THE MUTTON-FISH) is a *Lutjanus*, perhaps *L. aya* or some allied form.

T. 26. Remora (THE SUCKING FISH) belongs of course to *Echeneididæ*, though lack of detail will not allow even generic identification.

T. 27. Solea lunata et punctata (THE SOLE) I do not know.

T. 28. Orbis lævis variegatus (THE GLOBE FISH) is *Chilichthys turgidus.*

T. 29. Psittacus piscis viridis, Bahamensis (THE PARROT FISH) is *Pseudoscarus Catesbyi.*

T. 30. Acus maximus squammosa viridis (THE GREEN GAR-FISH) is *Lepidosteus osseus.*

T. 31. Acaranna major pinnis cornutis (THE ANGEL FISH) is *Holacanthus ciliaris.*

FISHES OF THE BERMUDA ISLANDS.

LIST OF SPECIES.

MALTHEIDÆ.

MALTHE VESPERTILIO, (*Linn.*) *Cuv.*, subspecies VESPERTILIO.

DEVIL-FISH.

Lophius fronte unicorni, LINNÉ, Mus. Ad. Fried. 1, 1754, 55.—ARTEDI, Syn. Pisc. 1788, 88.

Guaperva, BROWN, Hist. Jamaica, 1756, 457, pl. 48, f. 3.

Rana piscatrix americana, SEBA, Locup. Rer. Nat. Thes. Desc. 1, 1758, 118, tab. lxxiv, f. 2.

Lophius vespertilio, LINNÈ, Syst. Nat. ed. 10, 1, 1758, 236; ed. 12, 1, 1766, 402.—GMELIN, Linn. Syst. Nat. 1, 1788, 480 (*partim*).—BLOCH, Ichth. iv, 1787, 8, taf. ox. (on a drawing by Plumier).—SCHNEIDER, Bloch, Syst. Ichth. 1801, 140.—LACÉPÈDE, Hist. Nat. Poiss. 1, 1798, 302–315.

Malthe vespertilio, CUVIER, Règne Anim. 1817.—MÜLLER & TROSCHEL in Schomburgk, Hist. Barbados, 1848, 678.—GÜNTHER, Cat. Fish. Brit. Mus. iii, 1861, 200 (*partim*).—POEY, Mem. ii, 1861, 382; Rep. Fis.-Nat. Cuba, ii, 1868, 406.—COPE, Trans. Am. Phil. Soc. 1870, 480.—GILL in Baird's Rep. Sea Fisheries of New England, 1873, 792.

Malthea vespertilio, CUV. & VAL., Hist. Nat. Poiss. xii, 1837, 440.—STORER, Syn. Fish. N. Amer. 1846, 131.—GILL, Cat. Fish. E. Coast N. Amer. 1861, 47.—LÜTKEN, Nat. Foren. Vid. Med. 1865, 5.

Malthæa vespertilio, DEKAY, New York Fauna, Fish, 1842, 452.

A single specimen of this species was noticed in the collection of Mr. John T. Bartram, of Stocks Point, Saint George's Island. It is recorded from various points in the West Indies. Dr. Günther has united all described species, except *Malthe cubifrons*, Richardson, under the name *Malthe vespertilio*. The species thus limited is very variable in respect to the length of snout, which in some individuals equals one-sixth of the entire length of the fish, in others reduced to one-twentieth or one twenty-fifth. Professor Lütken recognizes three species within these limits; *Malthe vespertilio*, represented by the synonymy given

Malthe longirostris, Cuv. & Val., the Guacucuja of Marcgrave;* and *Malthe notata*, Cuv. & Val. These species seem to correspond with certain limits of variation, and are probably entitled to subspecific rank, particularly since these limits of variation are correlated with their geographical distribution. The form designated as *vespertilio* corresponds to section (*δ*) of Günther, having the snout one-ninth or one-tenth of the total length, and is recorded from Cuba, Jamaica, Santo Domingo, Porto Rico, and Martinique.

M. longirostris corresponds to section (*α*) of Günther, having the snout one-sixth of the total length, and is recorded from Bahia and Para.

M. notata was described from Surinam, and, according to Dr. Günther, from young specimens. Dr. Günther identifies it with a Demerara specimen, and refers it to section (*ε*), having the snout one-thirteenth of the total length.

M. angusta, corresponding to section (*η*) of Günther, with the snout one-twentieth to one twenty-fifth of the total length, represents the minimum development of snout, and is known from Brazil.

Malthe cubifrons, Richardson, is undoubtedly entitled to full specific rank.

ANTENNARIIDÆ.

PTEROPHRYNE PICTA, (*Val.*) *Goode.*

DEVIL-FISH; MARBLED ANGLER.

Lophius histrio, var. *b*, *pictus*, SCHNEIDER, Bloch, Syst. Ichth. 1801, 124.
Chironectes pictus, CUV. & VAL., Hist. Nat. Poiss. xii, 293, pl. 364.
Antennarius marmoratus, var. *a*, *picta*, GTHR., Cat. Fish. Brit. Mus. iii, 1861, 186.

A single specimen was given me by C. C. Keane, esq., of Hamilton, and I saw several others. The fish is pelagic, occurring only in the warmer parts of the Atlantic. Its home is among the floating masses of Gulf-weed (*Sargassum bacciferum*). It is often brought ashore in the beds of this alga, which is thrown up among the rocks in great heaps after the winter storms. I have seen its curious nest, consisting of a bunch of eggs adhering in glutinous masses to the *Sargassum*, the whole cluster large enough to fill a quart measure. One of these was thrown ashore in February, and is now in the collection of J. Matthew Jones, esq., of Halifax, Nova Scotia.

* Historia Naturalis Brasiliæ, 1648, p. 143.

DIODONTIDÆ.

PARADIODON HYSTRIX, (*Linné*) *Bleeker.*

SEA HEDGEHOG; SEA PORCUPINE.

Guamajacu Guara, MARCGRAVE, Hist. &c. Brazil. 1648, 158.

Diodon Hystrix, LINNÉ, Syst. Nat. ed. 10, 1, 1758, 335; ed. 12, 1, 1766, 413 (not Gmelin) Linné, Syst. Nat. 1, 1788, 449, according to BARNEVILLE, Revue zoologique 1846, 141).—POEY, Mem. ii, 1861, 361.—GÜNTHER, Cat. Fish. Brit. Mus., viii, 1870, 306.—COPE, Trans. Am. Phil. Soc. 1870, 480.

Paradiodon hystrix, BLEEKER, Atl. Ichth. v, 1865, tab. ccvii, f. 2.—POEY, Rep. Fis. Nat. Cuba, ii, 1868, 430.

Erizo, PARRA, Desc. Dif. Piez. Hist. Nat. Cuba, 1787, 60, lam. xxix, f. 1-2.

Diodon atinga, BLOCH, Ichth. iv, 1787, 75, taf. cxxv, (not Linné).—GMELIN, Linné, Syst. Nat. 1, 1788, 1449.—SCHNEIDER, Bloch, Syst. Ichth. 1801, 511.—LACÉPÈDE, Hist. Nat. Poiss. ii, 1801, 1-3.—SHAW, Gen. Zool. v, 1804, 434.—MÜLL. & TROSCH. in Schomburgk, Hist. Barbados, 1848, 677.—KAUP, Wiegmann's Arch. Naturg. xxi, 1855, 227.—JOUAN, Anim. Nouv. Caledonie, Mem. Soc. Imp. Sci. Nat. Cherbourg, 1861-'63, 18.—BLEEKER, Enum. Pisc. Arch. Ind. 1859, 203.

Diodon attinga, RUPPELL. Verzeichn. Senckenb. Mus. Fisch. 18[illegible]2, 35.

Diodon Plumieri, LACÉPÈDE, op. cit. ii, 1, 1801, 1-10, pl. iii, f. 3.

Diodon Brachiatus, SCHNEIDER, op. cit. 213 (founded on Parra's figure No. 1, cited above.)

Diodon punctatus, CUVIER, Mem. Mus. Hist. Nat. iv, 1818, 132, and Règne Animal, 1817, p.—. —BLEEKER, Verhandl. Bat. Gen. xxiv, Blootk. Vissch. 1852, 19.

This species, common in the West Indies, recorded also from the Pacific and the Indian Archipelago, is occasionally found here, and, on account of its bristly skin, is greatly prized by curiosity-hunters. It is never eaten. I saw four specimens, each about eighteen inches long.

CHILOMYCTERUS RETICULATUS, (*Linn.*) *Bibron.*

Orbis muricatus et reticulatus, WILLUGHBY, Ichthyographia, 1685, 155, tab. J, No. vii.—SEBA, Locup. Rer. Nat. Thes. Desc. iii, 1758, 58, tab. xxiii, f. 3.

Ostracion subrotundus, aculeis undique brevibus triquetris raris, ARTEDI, Gen. Pisc. 1738, 52, No. 16.

Diodon reticulatus, LINNÉ, Syst. Nat. 1, 1758, 334.—GMELIN, Linné, Syst. Nat. 1, 1788, 1449.

Chilomycterus reticulatus, BIBRON *apud* BARNEVILLE, Revue Zoologique, 1846, 141.—BLEEKER, Atl. Ichth. v, 1865, 54.—GÜNTHER, Cat. Fish. Brit. Mus. viii, 1870, 313.

Diodon atringa β, LINNÉ, op. cit. ed. 12, 1, 1766, 413.

? *Diodon atinga*, POEY, Mem. ii, 1861, 361; Rep. Fis. Nat. Cuba, ii, 1868, 429.—COPE, Trans. Am. Phil. Soc. 1870, 480.

Dr. Günther records a single specimen from the Bermudas. Another, in the University Museum at Middletown, Connecticut, is said to have come from the same locality.

Additional data are necessary in order to determine the true relations of Linné's *Diodon atringa* (*atinga*). Barneville and Bleeker consider it identical with *Diodon orbicularis* of Bloch. Günther does not commit himself decidedly, although he cites, under *Chilomycterus geometricus*, Marcgrave's *Guamajacu atinga*, upon which the species of Linné is presumably founded. The relations of the species *D. atinga* are important as throwing light upon the relations of the genus *Diodon*, of which it must be considered the type; there can be little doubt, however, that Bleeker is right is retaining in this genus those forms which have three rather than two roots to their spines.

TETRODONTIDÆ.

CHILICHTHYS SPENGLERI, (*Bloch*) *Goode.*

SWALLOW; PUFF-FISH.

Tetrodon Spengleri, BLOCH, Ichth. iv, 1787, 134, taf. cxliv.—SCHNEIDER, Bloch, Syst. Ichth. 1801, 504.—LACÉPÈDE, Hist. Nat. Poiss. i, 1798, 476–501.—SHAW, Gen. Zool. v, 1804, 445.—GÜNTHER, Cat. Fish. Brit. Mus. viii, 1870, 284.—COPE, Trans. Am. Phil. Soc. 1870, 479.

Tetrodon Plumieri, LACÉPÈDE, op. cit. 476–504, pl. xx, f. 3 (on a drawing by Plumier).

Tetrodon marmoratus, RANZANI, Nov. Comm. Acad. Bonon. iv, 1840, 72, pl. x, f. 1.—LOWE, Trans. Zool. Soc. ii, 1841, 193.—VALENCIENNES in Webb and Berthelot, Hist. Nat. Canaries, Poiss. 1836, pl. xx, f. 2.

A single specimen of two inches was found on the beach at Bayley's Bay. The species ranges from Madeira and Northwestern Africa to the Caribbean, and no doubt frequently occurs about the Bermudas. Bloch, in his description, figures the species with the imperforate nasal tentacles of the genus *Arothron*, giving the East Indies as its habitat. Making due allowances for the notorious carelessness of early ichthyologists in fixing the localities of specimens, and for the lack of detail in their drawings, we believe that the present name should be retained, since the fish figured by Bloch is unmistakably the one before us. Should time render it necessary to adopt another name, that of Ranzani, who described the species accurately, may be substituted.*

Color.—Above, light chestnut; beneath, clear white; a lateral band

* *Tetrodon marmoratus*, RANZANI, Novi Commentarii Acad. Sci. Inst. Bonon iv, 1840, *p. 72, pl. x, fig. 1.*

of tawny white, from chin to base of caudal rays, where it is confluent with a ring of the same color around the extremity of the caudal peduncle; beneath this lateral band a row of brown spots, of irregular size and fifteen in number, three being on the caudal peduncle; above a similar row, often very obscure. Caudal brown, with broad, median transverse band of yellow; other fins immaculate.

When inflated with air, the diameter of the belly is considerably greater than half the entire length of the fish.

Its habits are doubtless very similar to those of *Chilichthys turgidus* (Mitch.) Gill, common on the east coast of North America from Cape Cod to the Antilles, which it much resembles, and which is very likely to occur in the Bermuda waters.

OSTRACIIDÆ.

OSTRACIUM TRIQUETRUM, *Linn.*

CUCKOLD.

Ostracion triangulus, tuberculis, exiguis numeris aculeis carens, ARTEDI, Gen. Pisc. 1738, 57; Syn. Pisc. 1738, 85.

Ostracion polyodon inermis triqueter, LINNÉ, Mus. Ad. Fried. 1, 1754, 60.

Ostracion triqueter, LINNÉ, Syst. Nat. ed. 10, 1, 1758, 330; ed. 12, 1, 1766, 407.—BLOCH, Ichth. iv, 1787, 106, taf. CXXX.—GMELIN, Linné, Syst. Nat. 1, 1788, 1441.—SCHNEIDER, Bloch, Syst. Ichth. 1801, 498.—LACÉPÈDE, Hist. Nat. Poiss. 1, 444.—SHAW, Gen. Zool. v, 1804, 420.—MÜLL. & TROSCH. in Schomburgk, Hist. Barbados, 1848, 677.—HOLLARD, Ann. Sci. Nat. 1857, 154.—GÜNTHER, Cat. Fish. Brit. Mus. viii, 1870, 256.

Ostracion triquetrum, POEY, Mem. ii, 1861, 361; Rep. Fis.-Nat. Cuba, ii, 1868, 442.

Ostracium triquetrum, COPE, Trans. Am. Phil. Soc. 1870, 475.

Rhinesomus triqueter, SWAINSON, Nat. Hist. Fish. & Rept. ii, 1839, 324.

Common, as it also is throughout the West Indies and the Gulf of Mexico. Its length seldom exceeds eight inches. Its habits are sluggish, and it hugs very closely the bottom, where it is frequently taken in fish-pots.

The locomotion of the trunk-fishes is very peculiar, and I found an excellent opportunity for observing the movements of a Cuckold confined in my aquarium. The propelling force is exerted by the dorsal and anal fins, which have a half-rotary, sculling motion resembling that of a screw-propeller; the caudal fin acts as a rudder, save when it is needed for unusually rapid swimming, when it is used as by other fishes. The chief function of the broad pectorals appears to be that of fanning a

current of water through the gills, thus aiding respiration, which would otherwise be difficult on account of the narrowness and inflexibility of the branchial apertures.

When taken from the water, one of these fishes will live for two or three hours, all the time solemnly fanning its gills, and when restored to its native element seems none the worse for its experiences, except that, on account of the air absorbed, it cannot at once sink to the bottom. The Cuckold is not valued for food, though I am unable to learn that its use is ever followed by fatal results such as attend it in some of the West Indies.*

The local name is not applicable, and has probably been transferred from some other fish, as, for instance, the following species, which is known in Jamaica as "the cuckold."

Color.—Dark brown, thickly studded with circular spots of yellowish-white, each about two lines in diameter. The epidermis is often abraded, leaving the shell uniform tawny-white.

OSTRACIUM QUADRICORNE, *Linné.*

COW-FISH.

Piscis triangularis cornutus Clusii, WILLUGHBY, Hist. Pisc. 1686, xiv, tab. J.

Ostracion triangularis 2 aculeis &c., ARTEDI, Syn. Pisc. 1738, 85, No. 9.

Ostracion quadricornis, LINNÉ, Syst. Nat. ed. 10, 1, 1758, 331; ed. 12, 1, 1766, 408.—BLOCH, Ichth iv, 1787, 113, taf. cxxxiv.—GMELIN, Linné, Syst. Nat. 1, 1788, 1442.—SCHNEIDER, Bloch, Syst. Ichth. 1801, 499.—LACÉPÈDE, Hist. Nat. Poiss. 1, 179[illegible] 442, 468.—SHAW, Gen. Zool. v, 1804, 424.—KAUP, Wiegmann's Arch. Naturg. xxi [illegible] 1855, 218.—HOLLARD, Ann. Sci. Nat. 1857, 148.—BLEEKER, Poiss. Guinea, 186[illegible] 20.—GÜNTHER, Cat. Fish. Brit. Mus. viii, 1870, 258.

Ostracion quadricorne, POEY, Mem. ii, 1861, 362; Rep. Fis.-Nat. Cuba, ii, 1868, 439.

Ostracion (*Acanthostracion*) *quadricornis*, BLEEKER, Atl. Ichth. 1865, 32.

Ostracium quadricorne, COPE, Trans. Am. Phil. Soc. 1870, 474.

Lactophrys quadricornis, SWAINSON, Hist. Nat. Fish. & Rept. ii, 1839, 324.

Chopin, PARRA, Desc. Dif. Piez. Hist. Nat. Cuba, 1787, 31, lam. xvii.

Ostracion Lister, LACÉPÈDE, op. cit. 468, pl. xxiii, f. 2.

Ostracion serovratus, MITCHILL, Amer. Month. Mag. ii, 1818, 328.

Lactophrys serovratus, STORER, Syn. Fish. N. Am. 1846, 246.

Ostracion cornutus, MÜLL. & TROSCH. in Schomburgk, Hist. Barbados, 1848, 677 (not Linne or Bloch).

Ostracion maculatus, HOLLARD, op. cit. 149.

Common; its habits much like those of *Ostracium triquetrum*. Its range is much wider, including Saint Helena, Guinea, the Cape of

* Schomburgk, History of Barbados, p. 677.

Good Hope, and Charleston, S. C. Its occurrence in the Indian Archipelago is extremely doubtful, as Bleeker himself admits. This species is extremely variable, in length, breadth, and height of body, length of tail, and length of caudal, and these variations seem to be individual as well as related to age. Hollard's *Ostracion maculatus* * and the various *species dubia* of Poey † will probably prove to be forms of this species.

The presence of plates upon the caudal peduncle is apparently accidental. They may possibly have some relation to sex, but certainly none to age. Out of fourteen specimens examined, five had plates above and below, one had two above, and six had none. In none of the specimens can I distinguish traces of the spine in the middle of the dorsal ridge mentioned by Dr. Günther. The color of young specimens is well described by Günther; the bands on the cheek are, however, of a bright blue. Adult specimens are colored in a rich bright blue, which quickly vanishes after death. In some individuals, the color is worn from the ridges of the carapace, leaving patches of light brown. The largest specimens are twenty-one inches long.

The Cow-fish is, I was told, much esteemed for food, and is frequently baked whole in its shell. The popular name, like the Cuban "*toro*" and the Jamaican "cuckold," refers to the two horn-like supra-orbital spines.

BALISTIDÆ.

BALISTES CAPRISCUS, *Gmelin.*

TURBOT.

Balistes capriscus, GMELIN, Linné, Syst. Nat. 1, 1788, 1471.—SCHNEIDER, Bloch, Syst Ichth. 1801, 476.—LACÉPÈDE, Hist. Nat. Poiss. 1798, 1, 372, pl. xiii, f. 3.—SHAW, Gen. Zool. v, 1804, 411—RISSO, Ichth. Nice, 1810, 51.—YARRELL, Brit Fish. ii, 1841, 472.—HOLLARD, Ann. Sci. Nat. 1854, 309.—GÜNTHER, Cat. Fish. Brit. Mus. viii, 1870, 217.—GILL, in Baird's Rep. on Sea Fisheries of Southern New England, 1873, 793.

Balistes fuliginosus, DEKAY, New York Fauna, Fishes, 1842, 339, pl. lvii, f. 188.—STORER Syn. Fish. N. Am. 1846, 243.

Capriscus fuliginosus, GILL, Cat. Fish. E. Coast N. Am. 1861, 56.

Common. Very erratic in its distribution, having been observed in the Pacific at Panama, at Madeira, in the Mediterranean, and on the coast of Great Britain. DeKay figures a specimen taken in New York Harbor; the

* Annales des Sciences Naturelles, vii, p. 148.

† Repertorio Fisico-Natural de la Isla de Cuba, ii, pp. 439-440.

United States National Museum has specimens from Wood's Hole, Mass., Charleston, S. C., and the Tortugas; it is not recorded from the West Indies. The Turbot attains a weight of five or six pounds; its flesh is not unpalatable, and its tough, shagreen-like skin is used for polishing purposes. It has a habit of swimming on its side, just at the surface, like the Sunfish (*Mola rotunda*), and, from this habit as well as perhaps a fancied similarity of its form to that of the European Turbot (*Rhombus maximus*), its name appears to have been derived. It no doubt breeds in these waters; I have seen young individuals not exceeding three inches in length. The species should be compared with *Balistes sobaco*, Poey. No other species of this subfamily were observed.

I suppose the "Old-wife," "Ocean-turbot," and "Black-turbot" of the fishermen to correspond respectively to *Balistes vetula*, Linné, *Canthidermis maculatus*, (Gmelin) Bleeker, and *Melichthys buniva* (Lacépède), all of which, as well as *Balistes ringens*, Linné, are quite certain to occur in these waters.

ALUTERA SCRIPTA, (*Osbeck*) *Bleeker*.

Unicornis Piscis Bahamensis, CATESBY, Nat. Hist. Carol. Florida, and the Bahama Islands, ii, 1743, 19, tab. 19.

Balistes scriptus, OSBECK, Iter. Sin. 1765, 144.—GMELIN, Linné, Syst. Nat. 1, 1788, 1463.

Aluteres scriptus, BLEEKER, Ned. Tyds. Dierk. iii, 1865, 28; Ichth. 1865, 141, tab. ccxxvii, 4.

Monacanthus scriptus, GÜNTHER, Cat. Fish. Brit. Mus. viii, 1870, 252.

Lija Trompa, PARRA, Desc. Dif. Piez. Hist. Nat. Cuba, 1787, 46, lam. xxii, f. 1.

Balistes Lævis, BLOCH, Ichth. xii, 1797, 63, tab. ccccxiv.—SHAW, Gen. Zool. v. 1804, 405.

Aluterius lævis, CUVIER, Règne Animal, 1817.—CANTOR, Cat. Malayan Fish. 355.—BLEEKER, Verhandl. Batav. Gen. xxiv (Balistidæ), 21.—HOLLARD, Ann. Sci. Nat. 1855, 15.—DAY, Fish. Malabar, 1865, 355.

Alutera lævis, SWAINSON, Nat. Hist. Fish. & Rept. ii, 1839, 327.

Alcuteres lævis, RICHARDSON, Voy. H. M. S. Sulphur, 1845, 131, pl. lxi, f. 3.

Balistes Monoceros, var. *Lævis*, SCHNEIDER, Bloch, Syst. Ichth. 1801, 463.

Balistes ornatus, PROCÉ, Bull. Philom. 1822, 131.

Aluteres pareva, LESSON, Voy. Coquille, ii, 1830, 106.

Aluterus venosus, HOLLARD, op. cit. 14, pl. 1, f. 3.

Alutera picturata, POEY, Proc. Acad. Nat. Sci. Phila. 1863, 183; Rep. Fis.-Nat. Cuba, ii, 438.

Alcuteres picturatus, COPE, Trans. Am. Phil. Soc., 1870, 476.

A specimen twenty-one inches long was taken off the islands in April, 1872. The occurrence of the species is so unusual that it has no common name. It appears to be strictly pelagic, and is recorded from China, the Indian Archipelago, Tahiti, New Ireland, Coromandel, the Canaries, the West Indies, Brazil, and South Carolina.

HIPPOCAMPIDÆ.

HIPPOCAMPUS, *sp.*

SEA-HORSE.

Two specimens, apparently of different species, were secured; but, owing to the unsatisfactory nature of the published descriptions, it is impossible at present to identify them. One agrees tolerably with *H. antiquorum*, Leach.

SYNGNATHIDÆ.

SYNGNATHUS JONESII, *Günther.*

Syngnathus Jonesii, GÜNTHER, Ann. & Mag. of Nat. Hist. 1874.

This species was deservedly dedicated to J. Matthew Jones, esq., F. L. S., who is doing so much toward elucidating the natural history of these islands. Pipe-fishes are not uncommon. *S. pelagicus*, Osbeck, is likely also to occur.

AULOSTOMIDÆ.

AULOSTOMA MACULATUM, *Valenciennes.*

TRUMPET-FISH.

Trompetero colorado, PARRA, Descr. Dif. Piez. Hist. Nat. Cuba, 1787, 63, lam. xxx, f. 2.

Aulostoma maculatuus, VALENCIENNES in Cuvier, Règne Animal, 1817; ill. ed. Poiss. 1829, pl. xcii, f. 2.

Aulostoma coloratum, MÜLL. & TROSCH. in Schomburgk's Hist. Barbados, 1848, 173.—GÜNTHER, Cat. Fish Brit. Mus. iii, 1861, 536.—POEY, Rep. Fis.-Nat. Cuba, ii, 1868, 386.—COPE, Trans. Am. Phil. Soc. Phila. 1870, 480.

A dried head of this species was shown me by C. C. Keane, esq., of Hamilton. The fishermen speak of two Trumpet-fishes found here, one of them designated the Black Trumpet-fish. One of these is probably *Fistularia tabaccaria*, Linné. Mr. J. Matthew Jones informs me of the capture, in 1874, of a specimen of *Fistularia serrata*, Cuv., hitherto known only from the Indian and Pacific Oceans.

FIERASFERIDÆ.

LEFROYIABERMUDENSIS, *Jones.*

Lefroyia Bermudensis, JONES, Zoologist, Jan., 1874, 3838.

A single specimen four and one-half inches long was taken by Governor Lefroy in the summer of 1873.

"Total length rather more than 4½ inches. Greatest depth at the ver-

tical of the pectorals, three lines and one-half. The length of the head is slightly more than one-seventh of the total length. The greatest width of the head is rather less than one-third of its length. Body naked, attenuate, compressed. Facial outline rugose. Eye moderate; horizontal diameter of the eye-cup, one and three-quarter lines; vertical diameter, one and one-quarter lines. Gape of mouth wide. Lower jaw shorter, and received within the upper. Cardiform teeth of irregular size in both jaws, vomer, and palatines; those of the latter largest. Branchiostegals seven, inflated, united below. Vent thoracic. Pectorals originating at the upper angle of the operculum, three lines in extent, of delicate soft rays. Dorsal indistinct, commencing in a groove at about the vertical of the twentieth anal ray, continuous to caudal extreme; when in conjunction with the anal, it forms a small filamentous tip. Anal prominent, commencing immediately behind the vent, in advance of the vertical to the upper angles of the operculum, and extending to the caudal extreme. About its centre, it is equal in depth to that of the body at the same position. Owing to the delicate texture of the fins, it is impossible to determine the number of rays, but those of the anal exceed one hundred and forty. Color when dried, out of spirit, golden-yellow. The body transparent, showing the vertebra within, a condition, according to General Lefroy, equally observable in life."—*Jones.*

The genus proposed by Mr. Jones has not yet been defined, and the name *Lefroyia* can be adopted only provisionally.

BLENNIIDÆ.

LABROSOMUS NUCHIPINNIS, (*Quoy & Gaimard*) *Poey.*

MOLLY MILLER.

Clinus nuchipinnis, QUOY & GAIMARD, Voy. Uranie et Physicienne, Zool. 1824, 255.—GÜNTHER, Cat. Fish. Brit. Mus. iii, 1861, 262.

Labrosomus nuchipinnis, POEY, Rep. Fis.-Nat. Cuba, ii, 1868, 308.

Clinus pectinifer, CUV. & VAL., Hist. Nat. Poiss. xi, 1836, 374 (female).—MÜLL. & TROSCH. in Schomburgk's Hist. Barbados, 1848, 671.—CASTELNAU, Anim. Nouv. &c. Amérique du Sud, 1855, Poiss. 26.

Labrisomus pectinifer, SWAINSON, Nat. Hist. Fishes &c. 1839, 277.—COPE, Trans. Am. Phil. Soc. 1870, 473.

Labrosomus pectinifer, GILL, Proc. Acad. Nat. Sci. Phila. 1860, 105.—POEY, Mem. Hist. Nat. Cuba. ii, 1861, 381.

Clinus capillatus, CUV. & VAL., op. cit. 377 (male).—MÜLL. & TROSCH., l. c.

Labrisomus capillatus, SWAINSON, l. c.

Labrosomus capillatus, GILL, op. cit. 107.—POEY, l. c.

Lepisoma cirrhosum, DEKAY, New York Fauna, Fishes, 1842, 41, pl. xxx, f. 94.—STORER, Syn. Fish. N. Am. 49.

Very common under stones in tide-pools and in crevices; their habits closely resembling those of the "Rock-eel" (*Murænoides mucronatus*), so familiar to naturalists on the New England coast. Some individuals are brilliantly colored with red beneath, while others are gray. These differences are most probably sexual. My largest specimens are four inches long. The species is recorded from the Antilles, Bahia, Gorea, and the National Museum has specimens from Florida.

SALARIAS TEXTILIS, *Q. & G.*

Salarias textilis, QUOY & GAIMARD, MS.—CUVIER & VALENCIENNES, Hist. Nat. Poiss. xi, 307.

† *Salarias vomerinus*, CUV. & VAL., op. cit. 349.

Salarias vomerinus (CUV. & VAL. ?) JENYNS, Zool. Voy. H. M. S. Beagle, Fishes, 1842, 88, pl. 17, f. 3.

This species, found in tide-pools in company with the preceding, appears to be identical with that brought by Quoy and Gaimard from the Isle of Ascension. The measurements do not agree precisely with those given by Valenciennes (which are expressed in very general terms); its colors, however, are precisely the same. It agrees in many points with the specimens collected by Darwin at Porto Praya, and provisionally referred by Jenyns to *Salarias vomerinus*, C. & V.

The Bermuda specimens have the vomerine teeth and the four ventral rays, the omission of which in the description of *Salarias textilis* was Jenyn's chief reason for not referring the Cape Verde specimens to that species. The affinities of *S. textilis* and *S. vomerinus*, always considered close, have some light thrown upon them by the discovery of vomerine teeth in the former. The question of their identity, however probable it may seem, must be decided by the comparison of a larger series of specimens. Such study will probably result in the establishment of a new genus for the reception of the species at present referred to *Salarias*, which possess vomerine teeth.

A detailed description of the Bermuda specimens is given for convenience in future comparisons. The greatest height of the body, at the beginning of the dorsal, is slightly less than one-sixth (0.16) of the extreme length, and is four-fifths of the length of the head; the height of the lowest part of the caudal peduncle equals one-half the greatest height of the body (0.08). The head measures one-fifth (0.20) of total

length. The eye is slightly elliptical, and its longitudinal diameter equals the length of the snout, or one twenty-fifth (0.04) of the total length. The interorbital space equals half the diameter of the orbit, and is concave. The profile is very obtuse, and the eye is situated just within the angle formed by profile and crown. There are two broadly-palmated superciliary filaments, not so long as the diameter of the orbit; two similar but smaller ones at the nostrils; also two short filaments, one on either side of the nape. The lips are crénated at the sides of the mouth, though not anteriorly. In addition to the row of numerous small movable teeth common to all the species of the genus, there is a long recurved canine tooth on each side of the lower jaw, behind the series of small teeth; also, a transverse row of minute teeth on the anterior portion of the vomer.

The dorsal fin originates just behind the nuchal filaments, at a distance from the snout (0.22) slightly greater than the length of the head; its spinous portion nearly equals its soft portion, the former measuring 0.30, the latter 0.31. A deep notch almost separates the two parts.

The anal fin originates at a distance from the snout equal to one-half the length of the body exclusive of the caudal (0.42). Its first ray measures 0.07, its penultimate ray 0.12, its ultimate ray 0.05. The caudal is four twenty-fifths (0.16) of the total length, and is slightly rounded at the extremity. The pectorals equal the head in length (0.20), and barely reach to the vent. The distance from the snout to the upper axilla of the pectorals equals the distance to the origin of the ventrals, and also the length of the ventrals (0.11).

The lateral line is faintly indicated by a delicate line, arching above the pectorals, then running straight along the middle.

The radial formula is as follows:—D., XII–15; A., II, 15½; C., 3–6–5–3; P., 14; V., I–4.

The color is greenish above, becoming white beneath. Twelve or fourteen brownish-violet cross-bands, arranged in pairs, and in part interrupted by three series of whitish dots, so as to form a row of quadrate blotches just above the lateral line. The third row of white dots is more pronounced, the dots becoming short lines, and is situated on the lateral line; a fourth series, less pronounced, may be seen near the lower edge of the body.

A Y-shaped figure of brown upon the chin, the arms extending forward, and three other fine brown lines on each side of the throat, extending transversely upward and backward, continued upon the cheek and opercle by lines of fine brown dots. A row of similar dots may be seen

a little below the base of the anterior part of the dorsal. The fasciæ upon the sides extend on the dorsal, where they take an oblique direction backward. They are most pronounced at the base of the dorsal, forming a series of squares at the point of its junction with the body. The caudal has five or six irregular vertical lines. The anal is pale at its base, the tips of the rays dark brown, pectorals and ventrals dusky.

Measurements.

Extreme length, 0m.062	1.00
Body: Greatest height	.16
Head: Length	.20
Greatest width	.14
Length of snout	.04
Width of interorbital area	.02
Eye: Diameter	.04
Dorsal (spinous): Distance from snout	.22
Length of base	.31
Greatest height	.08
(soft): Length of base	.30
Greatest height	.31
Anal: Distance from snout	.42
Height at first ray	.11
Height at last ray	.05
Pectoral: Distance from snout at axilla	.11
Length	.20
Ventral: Distance from snout	.11
Length	.11

TRIGLIDÆ.

DACTYLOPTERUS VOLITANS, (*Linné*) *Cuv.*

Pirapebe or ***Miivipira***, MARCGRAVE, Hist. &c. Brasil, 1648, 162.

Trigla volitans, LINNÉ, Syst. Nat. ed. 10, 1, 1758, 302; ed. 12, 1, 1766, 498.—GMELIN, Linné, Syst. Nat. 1, 1788, 1346.—BLOCH, Ichth. x, 1797, 93, taf. cccli.—SCHNEIDER, Bloch, Syst. Ichth. 1801, 12.—SHAW, Gen. Zool. iv, 622, pl. xci.

Dactylopterus volitans, CUV. & VAL., Hist. Nat. Poiss. iv, 1829, 117.—DEKAY, New York Fauna, Fish. 1842, 49, pl. xvii, f. 46.—MÜLLER & TROSCHEL, Schomburgk, Hist. Barbados, 1848, 667.—GUICHENOT, Explor. Scient. Algérie, Rept. & Poiss. 1850, 41.—CASTELNAU, Anim. Nouv. &c. Amérique du Sud, Poiss. 1855, 26.—POEY, Mem. ii, 1861, 367; Rep. Fis.-Nat. Cuba, ii, 1868, 304.—GILL, Cat. Fish. E. Coast N. Am. 1861, 43; Baird's Rep. on Sea Fisheries of Southern New England, 1873, 799.—GÜNTHER, Cat. Fish. Brit. Mus. ii, 1861, 222.—BAIRD, Rep. on Sea Fisheries of Southern New England, 1873, 824.

Mercielago, PARRA, Descr. Dif. Piez. Hist. Nat. Cuba, 1787, 25, lam. xiv.

Polynemus sexradiatus, MITCHILL, Amer. Month. Mag. 1818, 323 (figured as "The Six-rayed Polyneme," Trans. Lit. & Phil. Soc. N. Y. 1815, pl. iv. f. 10).
Dactylopterus communis, OWEN, Descr. Cat. Ost. Series, Roy. Soc. Surg. 1, 1853, 56.
Gonocephalus macrocephalus, GRONOW, Cat. Fish. (1780), ed. Gray, 1854, 106.

Rare and without a common name. The Colonial Museum at Hamilton and Mr. Bartram's collection at Saint George's each contain a dried specimen. Mr. Jones secured one in Hamilton Harbor in October, 1851.

The species ranges from Newfoundland to Rio de Janeiro, throughout the West Indies, and to the Cape Verde Islands, and the Mediterranean, where it is comparatively common.

SCARIDÆ.

SCARUS RADIANS, *Valenciennes.*

SPANISH PORGY.

Scarus radians, CUV. & VAL., Hist. Nat. Poiss. xiv, 1839, 207.—STORER, Syn. Fish. N. Am. 1846, 147.—GÜNTHER, Cat. Fish. Brit. Mus. iv, 1862, 207.—GUICHENOT, Mem. Soc. Imp. Sci. Nat. Cherbourg, 1865, 10.—COPE, Trans. Am. Phil. Soc. 1870, 462.
Labrus radians, CASTELNAU, Anim. Nouv. &c. Amérique du Sud, 1855, 29.

Common, occurring in large schools. The greatest length observed was eight inches. Though seined in quantity, the Spanish Porgies are not eaten, their flesh, like that of the other members of this family, being dry and flavorless.

The species is recorded from Bahia, Mexico, and Saint Martin's. Specimens from Barbados and Jamaica are in the National Museum. Bermuda appears to be the northern limit of its range.

Color.—Above, olive, tinged with reddish-brown; beneath, rose-color; head, upper part of body, and dorsal marbled with brown; caudal irregularly banded with black, the extremity and spots on the membrane white; anal immaculate (in six specimens); base of pectorals black; chin white.

PSEUDOSCARUS VETULA, (*Schneider*) *Gill.*

MUD FISH.

Pagus, PARRA, Descr. Dif. Piez. Hist. Nat. Cuba, 1787, 36, num. 35, fig. 1.
Scarus vetula, BLOCH-SCHNEIDER, Syst. Ichth. 1, 1801, 239 (description founded on Parra's figure).—CUV. & VAL., Hist. Nat. Poiss. xiv, 1839, 193.—STORER, Syn. Fish. N. Amer. 148.—MÜLLER & TROSCHEL in Schomburgk's History of Barbados, 1848, 674.—COPE, Trans. Am. Phil. Soc. 1870, 462.

Pseudoscarus vetula, GILL, MS.

Scarus superbus, POEY, Mem. Hist. Nat. Cuba, ii, 1860, 218.

Pseudoscarus superbus, GÜNTHER, Cat. Fish Brit. Mus. iv, 1862, 218.—POEY, Rep. Fis.-Nat. Cuba, ii, 1868, 346.

Pseudoscarus psittacus, GÜNTHER, op. cit. 225.

The Mud-fish is very common, its gorgeous colors making it very conspicuous as it swims. The young may be seen by the hundred in the shallow rock-pools, while in the deeper waters the larger fish are sailing about with the precision and regularity of a squadron of cavalry under drill. Though its flesh is not unpalatable, this fish is not often brought to market; the enormous scales are much used in fancy work. The species is recorded from several Antilles.

The young fish differ much from the adult in coloration, their markings closely approximating those of *Pseudoscarus sanctæ-crucis* (Schn.) Gthr. Since no specimens of the latter species measuring more than eight or nine inches are on record, and none of *P. vetula*, in adult coloring, less than eighteen inches in length have fallen under my observation, it seems possible that the two species may be the same in different stages of growth, particularly since both are usually recorded from the same locality. The question of their identity may be easily decided by the Bermudian naturalists.

As is indicated in the synonymy, *vetula* is the specific name properly belonging to this species. Parra (l. c.) gives an excellent figure of the fish under the name *Vieja*, and on this figure Schneider founded his *Scarus vetula*, the specific name being a translation of Parra's *Vieja*. Of this fact, Valenciennes was aware, and by it he was guided in adopting the name of Schneider. Professor Poey renamed the species with the remark: "C'est à tort que M. Valenciennes rapport la figure de Parra au *Sc. vetula*," seemingly forgetful that Schneider's name was founded not upon specimens, but upon Parra's figure solely. Dr. Günther, adopting the views of Prof. Poey, cites *Scarus vetula* as a synonym of *Pseudoscarus psittacus*, (Linn.) Gthr.

PSEUDOSCARUS CÆRULEUS, (*Bloch*) *Günther*.

"CLAMACORE" OR "KILMAGORE."

Novacula cærulea, CATESBY, Nat. Hist. Carolina, Florida and the Bahama Islands, ii, 1743, 18, pl. 18.

Coryphæna cærulea, BLOCH, Ichth. v, 120.—GMELIN, Linné, Syst. Nat. 1, 1788, 1791.

Scarus cærulcus, SCHNEIDER, Bloch, Syst. Ichth. 1, 1801, 288.

Pseudoscarus cœruleus, GÜNTHER, Cat. Fish. Brit. Mus. iv, 1862, 227—GUICHENOT, Proc. Soc. Imp. Sci. Nat. Cherbourg, 1865, 24.—POEY, Rep. Fis. Nat. Cuba, ii, 1861, 348.

Trompa, PARRA, Descr. Dif. Piez. Hist. Nat. Cuba, 1787, 57, lam. xxvii, f. 2.

Loro, PARRA, l. c. f. 1.

Scarus loro, SCHNEIDER, op. cit. 288.

Scarus trilobatus, LACÉPÈDE, Hist. Nat. Poiss. iv, 1803, 21.

Sparus holocyanosus, LACÉPÈDE, op. cit. 45.

The "Clamacore" or "Kilmagore" is very unusual in Bermudian waters; a single specimen of thirty-six inches was taken outside the reefs in April, 1872, and was an object of much curiosity. The color in life was brilliant turquoise-blue, fading to olive-green in alcohol. The species is recorded from Cuba and some of the adjoining islands.

Dr. Günther suggests that this species is probably only the adult stage of one of the other species, such as *Pseudoscarus chloris*,* but an ex-

* The study of the synonymy of this species has brought to light an error, which may be referred to here. It appears that Parra's *Vieja*, No. 3, and Schneider's *Scarus chloris*, founded upon the figure of Parra, belong, not to *Pseudoscarus*, as is intimated by Dr. Günther, but to *Scarus;* such is the judgment of Professor Poey after consulting the type of Parra's description, preserved in the Museum in Madrid. M. Guichenot, after an examination of the types in the Musée d'Histoire Naturelle, Paris, retains in this genus *Scarus virens*, Valenc. There now remains only *Scarus quadrispinosus*, Val., as a synonym of Günther's *Pseudoscarus chloris*, and, of these names, that of Valenciennes has undoubted priority. The reversed synonymy should stand then somewhat as follows:—

SCARUS CHLORIS, *Schn.*

Vieja, PARRA, Descr. Dif. Piez. Hist. Nat. Cuba, 1787, 59, lam. 28, f. 3.

Scarus chloris, SCHNEIDER, Bloch, Syst. Ichth. 1801, 289 (on Parra's figure).—COPE, Trans. Am. Phil. Soc. 1870, 461.

Pseudoscarus chloris, GÜNTHER, Cat. Fish. Brit. Mus. iv, 1862, 227.

Scarus virens, CUV. & VAL., Hist. Nat. Poiss. xiv, 1839, 203.—STORER, Syn. Fish. N. Am. 1846, 146.—MÜLLER & TROSCHEL in Schomburgk's Hist. Barbados, 1848, 674.

Scarus chrysopterus, SCHNEIDER, op. cit. 286, pl. lviii.—CUV. & VAL., op. cit. 185.—STORER, op. cit. 143.—COPE, op. cit. 462.

Scarus laticeps, POEY, Mem. Hist. Nat. Cuba, 1860, ii, 219; Rep. Fis. Nat. i, 1867, 337, 375.

HABITAT.—Cuba, Santa Cruz, Saint Christopher's, Saint Thomas, Martinique, Porto Rico, Barbadoes.

PSEUDOSCARUS QUADRISPINOSUS, (*Valenc.*) *Guichenot.*

Scarus quadrispinosus, CUV. & VAL., Hist. Nat. Poiss. xiv, 1839, 197.—STORER, Syn. Fish. N. Am. 1846, 144.

Pseudoscarus quadrispinosus, GUICHENOT, Proc. Soc. Imp. Sci. Nat. Cherbourg, 1865, 27.

? *Scarus laticeps*, POEY, Mem. Hist. Nat. Cuba, ii, 1860, 217; Rep. Fis. Nat. ii, 1868, 369.

Pseudoscarus chloris (not Bloch), GÜNTHER, Cat. Fish. Brit. Mus. iv, 1862, 227.—COPE, Trans. Am. Phil. Soc. 1870, 461.

HABITAT.—Saint Thomas, Cuba, Jamaica, Bahamas.

amination of specimens has convinced me that this is not the case. In the National Museum are two well-characterized specimens of *Pseudoscarus cæruleus*, measuring nine and fifteen inches respectively, both of which have the hump upon the profile well developed, though not so prominent as in the adult specimen of thirty-six inches. Parra's two figures (lamina xxviii) named "Loro" and "Trompa" represent different ages of this species, the prolonged caudal lobes as well as the additional size of the caudal lobe being characters of age.

LABRIDÆ.

CHŒROJULIS RADIATUS, (*Linné*) *Goode.*

BLUE-FISH.

Turdus Oculo radiato (Pudding-wife), CATESBY, Nat. Hist. Carol. &c. 1743, ii, 12, tab. xii, fig. 1.

Sparus radiatus, LINNÉ, Syst. Nat. ed. 12, 1, 1776, 472.—GMELIN, Linné, Syst. Nat. 1, 1788, 1278.

Doncella, PARRA, Desc. Dif. Piez. Hist. Nat. Cuba, 1787, 95, lám. xxxvii, fig. 1.

Julis cyanostigma, CUV. & VAL., Hist. Nat. Poiss. xii, 1839, 391 (type 6 inches long).—MÜLL. & TROSCH. in Schomburgk's Hist. Barbados, 1848, 673.—STORER, Syn. Fish. N. Am. 1846, 139.

Platyglossus cyanostigma, GÜNTHER, Cat. Fish. Brit. Mus. iv, 1862, 161.—COPE, Trans. Am. Phil. Soc. 1870, 464.

Chœrojulis cyanostigma, POEY, Rep. Fis. Nat. Cuba, ii, 1868, 334.

Julis Principis, CUV. & VAL., op. cit. 402, (type 11 inches long).—STORER, op. cit. 140,

Platyglossus principis, GÜNTHER, op. cit. 164.

Julis patatus (partim), CUV. & VAL. op. cit. 398 (types 13 to 15 inches long).—STORER op. cit. 140.

The Blue-fish is frequently taken in the pots, though not valued as food. My largest specimen measures sixteen inches. The common name refers to the color of the adult fish. The species is recorded from several of the West India islands.

Color.—In the adult, a brilliant azure-blue, each scale edged with bright pearly-green. A longitudinal band on anal and the margin of the dorsal light blue. In the young, the prevailing hue is brownish, a large light-blue spot on the base of each scale. Head with spots and longitudinal stripes of light blue. Dorsal with broad margin, and four lines of spots and blotches, longitudinally arranged, of the same color. Caudal with broad white margin, outer rays blue to the extremity, the base of the fin thickly spotted with the same. Anal with border and two longitudinal lines of blue, the fin being thus divided into three

nearly equal parts, a large circular spot of the same color at the base of each ray except the first. Pectoral with the first five rays and a narrow transverse line across the base from the fourth ray blue.

My notes on the colors of young and adult specimens of this species have led me to believe that the different ages have been described under several different specific names, as the synonymy given above would indicate. *Julis cyanostigma* was the name given by Cuvier and Valenciennes to specimens six inches in length, *Julis principis* to those of eleven inches, while those ranging from thirteen to fifteen inches are included under *Julis patatus*. The specimens of larger size ("*l'individus à plus de quinzes pouces*"), included under the latter name, probably belong to another species. The 'Mudian fishermen recognize the difference in color to be caused by age.* I have seen specimens with the colors of immaturity, which had attained the length of ten inches. It will probably be found that the change of color is not restricted to any fixed period in the growth of the fish. Should farther investigations sustain the opinion of Dr. Günther† that Linné's *Sparus radiatus* is a different species from that figured by Catesby, the specific name *cyanostigma* should be retained.

LACHNOLÆMUS FALCATUS, (*Linné*) *Val.*

HOG-FISH.

Suillus (Great Hog-fish), CATESBY, Hist. Carol. Florida and the Bahama Islands, ii, 1743, 135, tab. xv.

Labrus falcatus, LINNÉ, Syst. Nat. ed. 10, 1, 1758, 284; ed. 12, 1, 1766, 475.—GMELIN, Linné, Syst. Nat. ed. 1, 1788, 1287.—LACÉPÈDE, Hist. Nat. Poiss. &c. iii, 1803, 425, 463.

Lachnolaimus falcatus, CUV. & VAL., Hist. Nat. Poiss. xiii, 276.—GÜNTHER, Cat. Fish. Brit. Mus. iv, 1862, 87.—POEY, Rep. Fis.-Nat. Cuba, ii, 1868, 330.—COPE, Trans Am. Phil. Soc. 1870, 464.

Lachnolaimus aigula, CUV. & VAL., op. cit. 277, tab. 388 (type 11 inches long).—STORER, Syn. Fish. N. Am., 136.

Lachnolaimus dux, CUV. & VAL., op. cit. 285 (type 8 inches long).—STORER, l. c.

Lachnolaimus suillus, CUV. & VAL., op. cit. 286 (type 24 inches long).—STORER, l. c.

Lachnolaimus caninus, CUV. & VAL., op. cit. 288 (type 10 inches long).—STORER, l. c.

Lachnolaimus psittacus, CUV. & VAL., op. cit. 291.—STORER, l. c.

Very common here, as it is throughout the West Indies. Hog-fish

* Since the above was written, I find that very similar conclusions have been reached by Professor Poey, who gives under *Chœrojulis cyanostigma* a synonymy much like the above.

† *Cat. Fish. Brit. Mus.* iv, p. 164, note.

Ledge, at the entrance to Hamilton Harbor, is marked by a pyramid of stone, called the "Hog-fish Beacon," which is surmounted by a huge iron image of a Hog-fish.

The long streamer-like appendages or continuations of the vertical fins give to the Hog-fish as it swims a singularly graceful appearance. The beauty of those exposed in the market is frequently marred, however, by having had these ornaments bitten off by the craw-fish and lobsters confined with them in the wells of the boats.

The Hog-fish attains the weight of twenty pounds, and is among the choicest of table-fish; its hard, white, exquisitely-flavored flesh has never been found injurious here, though in some parts of the West Indies it is regarded with suspicion. The common name refers to the swine-like profile and dentition.

HARPE RUFUS, (*Linné*) *Gill.*

Spanish Lady-fish.

Pudiano vermellio, Marcgrave, Hist. &c., Brasil, iv, 1648, 145.

Turdus flavus (Hog-fish), Catesby, Nat. Hist. Carol. Florida and the Bahama Islands, ii, 1743, 11, tab. xi, f. 1.

Labrus rufus, Linné, Syst. Nat. ed. 10, 1, 1758, 284; ed. 12, 1, 1766, 475.—Gmelin, Linné, Syst. Nat. 1, 1788, 1287.—Schneider, Bloch, Syst. Ichth. 1801, 244.—Lacépède, Hist. Nat. Poiss. iii, 1803, 427.

Cossyphus rufus, Günther, Cat. Fish. Brit. Mus. iv, 1862, 108.—Cope, Trans. Am. Phil. Soc. Phila. 1870, 463.

Harpe rufus, Gill, Proc. Acad. Nat. Sci. Phil. 1863, p. 222.

Bodianus rufus, Poey, Rep. Fis.-Nat. Cuba, ii, 1868, 331.

Perro colorado, Parra, Descr. Dif. Piez. Hist. Nat. Cuba, 1787, 3, lam. iii, fig. 1.

Bodianus bodianus, Bloch, Ichth. vii, 1797, 24, tab. ccxxiii.

Cossyphus bodianus, Cuv. & Val., Hist. Nat. Poiss. xiii, 1839, 103.

Lutjanus verres, Bloch, op. cit. tab. cclv.

Sparus verres, Shaw, Gen. Zool. iv, 1803, 414.

Cossyphus verres, Castelnau, Anim. Nouv. ou Rares, Amérique du Sud, Ichth. 1855, 27.

Sparus falcatus, Bloch, op. cit. tab. cclviii.

Bodianus Blochii, Lacépède, Hist. Nat. Poiss. iv, 1803, 279, 290.

Harpe cæruleo-aureus, Lacépède, op. cit. 426, 427, tab. viii. fig. 2.

Labrus semiruber, Lacépède, op. cit. iii, 428.

Not common. The species is also recorded from various of the West India Islands, the Gulf of Mexico, Bahia, Rio de Janeiro, and Saint Helena. Closely-related species are known in the Spanish and French Antilles under the names "Doncella" and "Demoiselle," and the Bermu-

dian name may perhaps be interpreted to mean "the fish which the Spanish call Lady-fish." The name is not inappropriate, for the species is remarkable for the grace of its form and the beauty and elegance of its colors. My specimens measure eight inches.

Color.—Head and upper half of body to the third ray of the soft dorsal rich chestnut-brown; the remainder, including the lower half of the operculum, bright golden-yellow.

The lips have conspicuous folds. The pre-operculum is *very perceptibly denticulated.* The two anterior ventral rays and the soft dorsal and anal and the caudal lobes are much produced, the dorsal and anal prolongations extending to the middle of the median caudal rays; the outer caudal rays are twice as long as the median.

POMACENTRIDÆ.

GLYPHIDODON SAXATILIS, (*Linné*) *Cuvier.*

COW-PILOT; SERGEANT-MAJOR.

Jaguacoaquare, MARCGRAVE, Hist. &c. Brasil. iv, 1648, 156.

Sparus fasciis quinque transversis fuscis, LINNÉ, Amœn. Acad. i, 1749, 312.

Chætodon fasciis quinque albis, cauda bifurca, LINNÉ, Mus. Ad. Fried. i, 1754, 54.

Chætodon saxatilis, LINNÉ, Syst. Nat. ed. 10, 1, 1758, 277; ed. 12, 1, 1766, 466.—GMELIN, Linné, Syst. Nat. 1, 1788, 1253.—BLOCH, Ichth. vi, 1787, 71, tab. ccvi, f. 2.

Glyphisodon saxatilis, CUV. & VAL., Hist. Nat. Poiss. v, 1830, 446.—MÜLLER & TROSCHEL Schomburgk's Hist. Barbados, 1848, 674.—CASTELNAU, Anim. Nouv. ou Rares, Amérique du Sud, 1855, 11.

Glyphidodon saxatilis, GÜNTHER, Cat. Fish. Brit. Mus. iv, 1862, 36.—POEY, Rep. Fis.-Nat. Cuba, ii, 1868, 329.—COPE, Trans. Am. Phil. Soc. 1870, 461.

Chætodon Marginatus, BLOCH, op. cit. tab. ccvii.—LACÉPÈDE, Hist. Nat. Poiss. iv, 1803, 451, 463.

Chætodon Mauritii, BLOCH, op. cit. tab. ccxiii, f. 1.—SCHNEIDER, Bloch, Syst. Ichth. 1801, 234.—LACÉPÈDE, op. cit. 452, 470.

Chætodon sargoides, LACÉPÈDE, op. cit. 453, 471, 472.

Very common in sheltered waters. The largest, six to eight inches in length, frequent the shallow shaded coves in company with *Pseudoscarus vetula*, *Holacanthus ciliaris*, and *Sarothrodus bimaculatus.* The young may be seen basking in every shallow tide-pool. The origin of the common name is not apparent, unless it refers to some supposed relation between this species and the Cow-fish (*Acanthostracium quadricorne*), such as *Naucrates ductor* is supposed by sailors to hold with the Sharks. The fish is sometimes called the "Sergeant-major," in allusion to the chevron-like bands of yellow on the sides. The species is very common through-

out the West Indies, and has been observed as far south as Bahia and east to the Cape Verde Islands. Its accidental occurrence at Newport, R. I., has been recorded.

Color.—Adults golden-green, young golden-yellow, with five black cross-bands, which are not as broad as the interspaces between them, the first from a point in front of the origin of the dorsal to the base of the pectoral; the second below the third and fifth dorsal spines; the third from the eighth and tenth dorsal spines toward the vent; the fourth from the twelfth and thirteenth dorsal spines to the middle of the anal; the fifth below the end of the soft dorsal and continued on the posterior rays of the dorsal and anal.

The ventrals, soft dorsal, and anal are produced; the fourth and fifth rays of soft dorsal and the fifth and sixth of anal longest. Dorsal and anal prolongations in young reaching to a point half-way between the posterior angle of dorsal and the base of caudal rays; in adults reaching quite beyond the base of caudal rays. External caudal rays twice the length of median.

GERRIDÆ.

EUCINOSTOMUS GULA, (*Cuv. & Val.*) *Goode.*

SHAD.

Gerres gula, CUV. & VAL., Hist. Nat. Poiss. vi, 1830, 464.—JENYNS, Zool. Voy. H. M. S. Beagle, 1842, 58.—GÜNTHER, Cat. Fish. Brit. Mus. iv, 1862, 255.—MÜLLER & TROSCHEL, Schomburgk, Hist. Barbados, 1848.—POEY, Mem. Hist. Nat. Cuba, ii, 1861, 368.

Diapterus gula, POEY, Rep. Fis.-Nat. Cuba, ii, 1868, 323.

Common and secured in quantity in the shallow bays, with *Decapterus punctatus*, *Eucinostomus Lefroyi*, and *Trachurops crumenophthalmus*. The largest specimens seen, which were apparently adult, measure six inches in length; intermediate sizes down to one inch were observed.

The species has also been seen about Martinique, Santo Domingo, Cuba, Jamaica, and Bahia. The "*Turdus cinereus peltatus*" of Catesby,* for which he gives the common name of "Shad," seems to be identical with this species or the closely-allied *Eucinostomus aprion*, if not with the following species.

EUCINOSTOMUS LEFROYI, *Goode.*

LONG-BONED SHAD.

Diapterus Lefroyi, GOODE, Amer. Journ. Sci. & Arts, viii, 1874, (Aug.) 123.

This species is distinguished from all other members of the family and genus by its relatively greatly-elongated form. The body is fusiform,

*Natural History of Carolina, Florida, and the Bahamas, ii, p. 11, t.

compressed: its greatest height, at the thoracic region, being a little less than one-fourth (0.23) of the total length, and a little more than one-fourth (0.27) of the length without caudal (0.89). In *Eucinostomus aprion*, the most elongated of the species hitherto described, the greatest height is but one-third of the length.

The height of the body is uniform under the spinous portion of the dorsal, sloping gently, and at a nearly uniform angle above and below, to the middle of the caudal peduncle. The height of the body behind the dorsal (0.10) is less than one-half, that of the least height of the tail (0.06) is one-fourth of the greatest height of the body.

The scales are large, measuring 0.03 and 0.04 in height, and 0.02 and 0.03 in length; they form about forty-five oblique transverse rows between the head and the caudal, four and a half longitudinal rows between the back and the lateral line, and ten longitudinal between rows the lateral line and the belly.

The length of the head (0.22) equals the greatest height of the body, and is double the greatest width of the head (0.11); the height at the pupil (0.14) is double the width of the interorbital space (0.07). The length of the snout (0.06) equals the length of the operculum (0.06); when the mouth is protruded, the length of the snout is doubled (0.12), and when retracted, the posterior extremity of the intermaxillary process extends to the vertical through the center of the pupil. The nasals are very prominent, and the nostrils are nearer to the orbit than to the extremity of the jaw. The orbit is circular, its diameter (0.08) one-third the length of the head.

The origin of the dorsal is slightly behind that of the ventral; its distance from the snout (0.31) twice the length of its base (0.16). The dorsal spines are graduated nearly in the proportion (I = 0.02; II = 0.12; III = 0.11; IV = 0.10; V = 0.09; VI = 0.085; VII = 0.725; VIII = 0.05; IX 0.04). The notch between the spinous and soft portions is very deep, and the connecting membrane barely perceptible. In the soft dorsal, the fifth ray is the longest (0.09), and equals the fifth spine; the succeeding rays diminishing regularly to the last, which equals the ultimate spine (0.04); the length of its base (0.20) is greater than that of the spinous dorsals. The anal begins behind the center of the body (0.56); the first spine is very short (0.01), one fifth the length (0.05) of the second, which is slender; the third ray is the longest (0.08); the succeeding rays regularly diminishing in length to the last (0.03). The lobes of the caudal are equal; the outer ray in length (0.21) five times the inner ones (0.04). The extremity of the pectoral reaches the vertical from the last dorsal spine; its distance

from the snout at the axilla (0.25) is nearly equal to the length of the body. The ventral spine resembles the fifth dorsal spine in shape and size. The length of the longest ray (0.11) slightly exceeds one-third of the distance from the snout to the ventral axilla (0.30); the axillary appendage consists of four lanceolate scales, the first and the longest as long as the last ventral ray.

Color.—Silvery, with a bluish tint above; axils of the pectorals and extremity of snout brownish. Radial formula: D. IX, 10; A. II, 8, P. 12; V. I, 5; C. 3, 9, 9, 3.

The unit of measurement used above is the one-hundredth of the total length, which in an average specimen is 7.29 inches (0^{m}.185). The species is common in the protected inlets about the islands, in company with the preceding species, the "Shad." The "Long-boned Shad" are in much demand for bait, and are easily seined in large quantities.

The species is dedicated to his excellency Maj. Gen. J. H. Lefroy, F. R. S., governor of the Bermudas, a gentleman of well-known scientific attainments and reputation, who, while doing so much for the social and political welfare of the islands, is also taking an active part in the development of their natural history.

Since the publication of the preliminary description of this fish, I have had the opportunity of comparing specimens from the Bermudas with others sent from Havana to the National Museum by Professor Poey, by whom the species had been recognized as new, and described in MS. under the name of *Eucinostomus productus*. The specimens are precisely the same, and coincide in having only two anal spines; a character in which they differ from the remainder of the genus, and which may prove to be, as suggested by Professor Poey, an indication of generic distinction.

TEUTHIDIDÆ.

ACANTHURUS NIGRICANS, (*Linné*) *Gill.*

DOCTOR-FISH.

Turdus rhomboidalis, CATESBY, Nat. Hist. Carolina, Flor. and the Bahama Islands, ii, 1743, 10, tab. x, fig. 1.

Chætodon nigriscens cauda albescente æqali utrinque aculeata, ARTEDI, Desc. Spec. Pisc. 90.

Chætodon nigricans, LINNÉ, Syst. Nat. ed. 10, 1, 1758, 274; ed. 12, 1, 1766, 462.—GMELIN, Linné, Syst. Nat. 1, 1788, 1245.

Acanthurus nigricans, GILL in Baird's Report Sea Fisheries of Southern New England, 1873, 801.

Acanthurus cœruleus, SCHNEIDER, Bloch, Syst. Ichth. 1801, 214.—CUV. & VAL., Hist. Nat. Poiss. x, 1835, 179.—GUICHENOT, Poiss. in Sagra, Hist. Nat. Cuba, 1845, 121.—STORER, Syn. Fish. N. Amer. 1846, 112.—CASTELNAU, Anim. Nouv. ou Rares, Amérique du Sud, 1855, 25, pl. 12, f. 2.—GÜNTHER, Cat. Fish. Brit. Mus. iii, 1861, 336.—POEY, Rep. Fis.-Nat. Cuba, ii, 1868, 355.—COPE, Trans. Am. Phil. Soc. 1870, 474.

Not uncommon. The species extends through the West Indies, and has also been observed on the coasts of Florida and South Carolina. Its quick nervous movements, as it plays about the recesses in the reef, are very characteristic. The local name has reference to the lancet-like processes on the sides of the caudal peduncle. The "Barbero" and "Barbeiro" of Cuba and Brazil, and the "Chirurgien-bleu," "Porte Lancette," and "Saigneur" of the French Antilles, are names of similar origin.

Color.—Bluish-brown; dorsal and anal with numerous obliquely longitudinal lines of light blue. Caudal spine amber-colored, glassy, posteriorly half as long as anteriorly. A prominence in front of orbit; profile of snout slightly concave. Operculum, pre-operculum, and scapular bones with deep striæ. Upper jaw with seven, lower with eight five to eight lobed incisors.

ACANTHURUS CHIRURGUS, (*Bloch*) *Schneider.*

DOCTOR-FISH.

Chætodon nigricans, BLOCH, Ichth. vi, 1787, 60, tab. cciii (not Linné).

Acanthurus nigricans, SCHNEIDER, Bloch, Syst. Ichth. 1801, 211.

Chætodon chirurgus, BLOCH, op. cit. tab. ccviii.—GMELIN, Linné, Syst. Nat. 1788, 1259.

Acanthurus chirurgus, SCHNEIDER, op. cit. 214.—CUV. & VAL., Hist. Nat. Poiss. x, 1835, 168.—GUICHENOT, Poiss. in Sagra, Hist. Nat. Cuba, 1845, 120.—STORER, Syn. Fish N. Am. 1846, 112.—CASTELNAU, Anim. Nouv. ou Rares, Amérique du Sud, 1855, 24.—GÜNTHER, Cat. Fish. Brit. Mus. iii, 1861, 329.—POEY, Rep. Fis. Nat. Cuba, ii, 1868, 355.—COPE, Trans. Am. Phil. Soc. Phila. 1870, 474.—GILL in Baird's Rep. Fisheries of Southern New England, 1873, 801.

Acronurus fuscus, GRONOW, Cat. Fish. (1780), ed. Gray, 1854, 191.

This species undoubtedly occurs, associated as it always is with the preceding. The name "Tang," found in the list of local names, is probably applied to one or both, if we can judge from the remarkable correspondence of the local names in the Bermuda and Bahama groups.

CHÆTODONTIDÆ.

SAROTHRODUS BIMACULATUS, (*Bloch*) *Poey*.

FOUR-EYED FISH.

Chætodon bimaculatus, BLOCH, Ichth. vii, 1797, tab. ccxix, f. 1.—SCHNEIDER, Bloch, Syst. Ichth. 1801, 225.—CUV. & VAL., Hist. Nat. Poiss. vii, 1831, 67.—STORER, Syn. Fish. N. Am. 1846, 86.—GÜNTHER, Cat. Fish. Brit. Mus. ii, 1861, 9.—POEY, Mem. Hist. Nat. Cuba, ii, 1861, 371.

Sarothrodus bimaculatus, POEY, Rep. Fis. Nat. Cuba, ii, 1868, 353.—COPE, Trans. Am. Phil. Soc. 1870, 474.

The "Four-eyed Fish" is usually seen in sheltered coves, lazily swimming a few feet below the surface, under the shadow of some high rock. Its local name has reference to the eye-like spots near the tail, which the fishermen believe to be a true pair of eyes. The species is also recorded from the northern West Indies.

Color.—Pearly-gray; snout, posterior edge of operculum, base of pectoral, the anal, caudal, and dorsal bright yellow, blending into the gray of the body. A band, black, edged with yellow, extends from a point in front of and below the first dorsal spine across the eye to the margin of interoperculum; soft dorsal with a large round indistinct black spot at its base between the fifth and twelfth rays, and a small spot of deep black at its angle; soft dorsal with narrow marginal line of black; soft anal with narrow, submarginal band of light blue, anteriorly edged with black; caudal with terminal band of bluish-white, with bright-yellow center; base of ventrals blotched with yellow.

HOLACANTHUS CILIARIS, (*Linné*) *Lacépède*.

ANGEL-FISH.

Acarauna major pinnis cornutis, CATESBY, Nat. Hist. Carolina, Florida, and the Bahama Islands, ii, 31, tab. xxxi, 1743.

Chætodon griseus fasciis quatuor fuscis, LINNÉ, Mus. Ad. Fried. 1, 1754, 62, tab. xxxiii, f. 1.

Chætodon ciliaris, LINNÉ, Syst. Nat. ed. 10, 1, 1758, 276; ed. 12, 1, 1766, 465.—GMELIN, Linné, Syst. Nat. 1, 1788, 1252.—BLOCH, Ichth. vi, 1788, 83, taf. ccxiv.—SCHNEIDER, Bloch, Syst., Ichth. ed. 1801, 218.

Holacanthus ciliaris, LACÉPÈDE, Hist. Nat. Poiss. iv, 1803, 527-534.—CUV. & VAL. Hist. Nat. Poiss. vii, 1831, 154.—GÜNTHER, Cat. Fish. Brit. Mus. ii, 1861, 46.—POEY, Mem. Hist. Nat. Cuba, ii, 1861, 371; Rep. Fis.-Nat. Cuba, ii, 1868, 351.—GILL, Baird, Rep. on Sea Fisheries of Southern New England, 1873, 802.

Gabelita, PARRA, Desc. Dif. Piezas Hist. Nat. Cuba, ii, 1787, 11, tab. vii, f. 1.

Chætodon Parræ, SCHNEIDER, op. cit. 235 (on Parra's figure).

Chætodon squamulosus, SHAW, Nat. Misc. ——, 275.
Chætodon Catesbeii, SHAW, Gen. Zool. iv, 1, 1803, 325.
Chætodon cornutus, DESMAREST, Déc. Ichthyol.
Chætodon aculeatus, GRONOW, Cat. Fishes (1780), ed. Gray, 1854, 72.

Common. The species is found, also, in the West Indies, at Bahia, and on the coasts of Mexico. The Angel-fish is partial to sheltered parts of the reef, where it may be seen lazily and gracefully swimming or floating a few feet below the surface. Its motions are very slow, and it frequently swims upon its side, or, sinking to the bottom, swims perpendicularly to the surface, where its bright colors flash for a moment as it floats broadside upward. I have frequently seen them grazing upon the alga-covered rocks. The Angel-fish attains the weight of four pounds, and as far surpasses all the other fishes of the region in its delicious flavor as in its lovely hues. The largest I have seen measured fifteen inches from snout to extremity of soft dorsal.

Color.—Brown with a shade of olive-green, each scale edged with a lighter tint; on the dorsal and anal fins, the brown has reddish tinge. Chin, nape, base of pectoral, borders, and spines of operculum and preoperculum, bright cobalt-blue. Extremity of pectorals, bright yellow. Borders of dorsal and anal bright blue, passing through a vivid green to bright yellow on the slender streamers formed by the prolongations of the soft dorsal and anal fins. Caudal bright yellow, with narrow border of greenish blue. Base of ventrals blue, passing through green into yellow at the extremities. Young and half-grown individuals are ornamented with three or four broad transverse bands of blue and yellow.

My specimens, some twelve in number, differ from all descriptions in the absence of the spot of brown, encircled with blue, on the nape. I have examined numerous West Indian specimens and find it universally present. Should this character prove constant, the Bermuda Angel-fish may be considered a geographical variety, *Holacanthus ciliaris*, var. *Bermudensis*.

HOLACANTHUS TRICOLOR, (*Bloch*) *Lacépède.*

BLACK ANGEL-FISH.

Acarauna, EDWARDS, pl. 583, f. 4.
La Veuve Coquette, DUHAMEL, Trait. Gén. Pesch. 1782, pt. 2, pl. 13, f. 1.
Catalineta, PARRA, Descr. Dif. Piez. Hist. Nat. Cuba, 1787, 12, lam. vii, f. 2.
Chætodon tricolor, BLOCH, Ichth. xii, 1797, tab. 425.—SCHNEIDER, Bloch, Syst. Ichth. 1801, 219.

Holacanthus tricolor, LACÉPÈDE, Hist. Nat. Poiss. iv, 1803, 525-530.—CUV. & VAL., Hist. Nat. Poiss, vii, 1831, 162.—CASTELNAU, Anim. Nouv. ou Rares, Amér. du Sud, 1855, 19.—GÜNTHER, Cat. Fish. Brit. Mus. ii, 1861, 49.—POEY, Mem. Hist. Nat. Cuba, ii, 1861, 371; Rep. Fis.-Nat. Cuba, ii, 1868, 352.

Occasional. Mr. Jones captured a specimen in 1871, and the name occurs on the local list. The species occurs throughout the West Indies, and is also recorded from Bahia and Trinidad.

Chætodon arcuatus, (Linn.) Cuvier, is also likely to occur in these waters.

XIPHIIDÆ.

The name of "Sword-fish" occurs on the local list. The common Sword-fish (*Xiphias gladius*, Linn.) must occur in Bermuda waters, and probably also *Tetrapturus albidus*, Poey, and *Histiophorus americanus*, Cuv. & Val.

The following reference to the Sword-fish occurs in "Newes from the Bermudas," a pamphlet dated Burmuda, July, 1609, and reprinted in "Force's Historical Tracts," vol. ii.

Whale, Sword-fish & Threasher.—"The sword fish swimmes under the whale, & pricketh him upward: The Threasher keepeth above him, & with a mighty great thing like unto a flaile, hee so bangeth the whale, that hee will roare as though it thundered, & doth give him such blowes, with his weapon, that you would thinke it to be a crake of great shot."—(Page 22.)

SCOMBRIDÆ.

ORCYNUS ALLITERATUS, (*Rafinesque*) *Gill.*

MACKEREL.

Scomber alliteratus, RAFINESQUE, Caratteri &c. Anim. Sicilia, 1810, 46.

Orcynus alliteratus, GILL, Baird, Rep. Sea Fisheries of Southern New England, 1873, 802.—BAIRD, Rep. Sea Fisheries of Southern New England, 1873, 825.

Maquereau à Quatre Points, GEOFFR. ST. HILARIE, Desc. Egypt. Hist. Nat. 1813, pl. xxiv, f. 3.

Thynnus Leachianus, RISSO, Hist. Nat. Eur. Merid. iii, 1827, 414.

Thynnus thunnina, CUV. & VAL., Hist. Nat. Poiss. viii, 1831, 104.—BLEEKER, Verhandl. Batav. Genootsch. xxiv, 1851, 36.—TEMM. & SCHLEG., Fauna Japonica Poiss. 1850, 95, pl. 48.—GUICHENOT, Rept. et Poiss. Exp. Scient. Algérie, 1850, Poiss. 57.—GÜNTHER, Cat. Fish. Brit. Mus. ii, 1861, 364.

Orcynus thunnina, POEY, Rep. Fis.-Nat. Cuba, 1, 1867, 321; ii, 1868, 362.

Thynnus Brasiliensis, CUV. & VAL., op. cit. 110.—POEY, Mem. Hist. Nat Cuba, ii, 1861, 373.

Thynnus vágans, LESSON, Voy. Coquille, Zool. ii, 1830, 162, pl. cxxxii.

Large schools were observed in March. This large and powerful pelagic fish has been observed in the Mediterranean, on the east of Norway, in the East Indies, on the coasts of Brazil and Cuba, and was found in 1871 by Professor Baird in large numbers at Wood's Hole, Mass., and several have since been taken off the shores of Southern New England. It is highly valued for bait, but is the only large fish which is not thought good to eat; though rather oily, I think it superior to many of the Bermuda food-fishes. It attains the length of two feet and a half.

CARANGIDÆ.

DECAPTERUS PUNCTATUS, (*Agassiz*) *Gill.*

ROUND ROBIN.

Scomber hippos, MITCHILL, Amer. Month. Mag. 1818, 246 (not Linné), (figured as "The Hippos Mackerel," Trans. Lit. & Phil. Soc. N. Y. 1815, pl. 5, f. 5).

Caranx punctatus, AGASSIZ, Selecta Gen. et Spec. Pisc. Brasil, coll. Spix, 1829, 108, pl. lvi *a*, f. 2.—CUV. & VAL., Hist. Nat. Poiss. ix, 1833–38.—DEKAY, New York Fauna, Fish, 1842, 122, pl. 73, f. 123 (copied from Mitchill).—STORER, Syn. Fish. N. Am. 1846, 101.—GÜNTHER, Cat. Fish. Brit. Mus. ii, 1861, 446.

Decapterus punctatus, GILL, Proc. Acad. Nat. Sci. Phila. 1862, 432; and in Baird, Rep. on Sea Fisheries of Southern New England, 1873, 803.—POEY, Rep. Fis.-Nat. Cuba, ii, 1868, 368 (see, also, Mem. ii, 374).—BAIRD, Rep. on Sea Fisheries of Southern New England, 1873, 825.

Very common. This species ranges along the coast from Brazil to Cape Cod, and has been seen at Cuba and Martinique. The Round Robin is seined in great numbers in Hamilton Harbor, in company with the various species of *Clupeidæ* and *Gerridæ*, and is sold from row-boats along the quay at the legal rate of four-pence a pound. The largest measure six inches. "Jigging robins" is a favorite amusement of the little negroes. A few bread-crumbs are thrown over the dock, and the little fish collect in such numbers that a line with a bare fish-hook jerked rapidly through the group seldom fails to impale one or more. The local name seems to be fanciful in origin; at Barbados, it is given to the allied species *Decapterus macarellus*, which perhaps also occurs at the Bermudas.

Color.—Above, olive-brown; beneath, white, with pearly reflections. A golden stripe along the lateral line, studded with small black spots, which cease at the commencement of the lateral plates. Eye yellow, with black iris.

TRACHUROPS CRUMENOPHTHALMUS, (*Bloch*) *Gill.*

GOGGLER; GOGGLE-EYE.

Scomber crumenophthalmus, BLOCH, Ichth. x, 1797, 65, taf. cccxliii.

Caranx crumenophthalmus, LACÉPÈDE, Hist. Nat. Poiss. iv, 1803, 107.—CUV. & VAL., Hist. Nat. Poiss. ix, 1833, 62.—GÜNTHER, Cat. Fish. Brit. Mus. ii, 1861, 429.

Trachurops crumenophthalmus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 432; and in Baird, Reps. on Sea Fisheries of Southern New England, 1873, 803.—POEY, Rep. Fis. Nat. Cuba, ii, 1868, 367.—BAIRD, Rep. on Sea Fisheries of Southern New England, 1873, 825.

Scomber balantiophthalmus, SCHNEIDER, Bloch, Syst. Ichth. 1801, 29.

Scomber plumieri, BLOCH, op. cit. tab. cccl.xiv.—SCHNEIDER. op. cit. 30.

Caranx plumieri, CUV. & VAL., op. cit. 65.—MÜLL. & TROSCH., Schomburgk, Hist. Barbados, 1848, 669.—GUICHENOT, Poiss. in Sagra, Hist. Nat. Cuba, ii, 1845, 110.

Caranx Daubentonii, LACÉPÈDE, op. cit. iii, 59, 71.

Caranx macrophthalmus, RÜPPELL, Atlas, Reise Nord-Africa, Fische, 1828, 97, tab. xxv, f. 4 (not Agassiz).

Caranx macrophthalmus, AGASSIZ, in Spix, Select. Gen. & Spec. Pisc. Brasil, 1829, 107, pl. lvi *a*, f. 2 (not Rüppell).

Caranx mauritianus, QUOY & GAIMARD, Voy. Uranie & Physicienne, Zool. 1824, 359.

Common; the species, like the preceding, is found in the West Indies and on the coast of the United States to Southern Massachusetts; it is found also at Mauritius, in the Pacific and Indian Oceans, the Red Sea, and on the coast of Guinea. The Goggler reaches the weight of a pound, is found with the preceding, and is used for food. The local names refer to its great, staring eyes.

Color.—Above, bluish; beneath, silvery white.

PARATRACTUS PISQUETUS, (*Cuv. & Val.*) *Gill.*

JACK; BUFFALO JACK.

Caranx pisquetus, CUV. & VAL., Hist. Nat. Poiss. ix, 1833, 97.—POEY, Mem. Hist. Nat. Cuba, ii, 1861, 373.

Paratractus pisquetus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 432; Baird's Rep. Sea Fisheries of Southern New England 1873, 803.—POEY, Rep. Fis. Nat. Cuba, ii, 1868, 365.—BAIRD, Rep. Sea Fisheries of Southern New England, 1873, 825.

Caranx chrysos, DEKAY, Fishes, New York Fauna, 1842, 121, pl. xxvii, f. 85 (not *Scomber chrysos*, Mitchill).—BAIRD, Fishes New Jersey Coast, 1855, 22.

Carangus chrysos, GIRARD, Ichth. U. S. & Mex. Bound. Surv. 1859, 23.

Caranx hippos, HOLBROOK, Ichth. South Carolina, 1856, 88, pl. xii, fig. 2 (not *Scomber hippos*, Linné).

Carangus hippos, Gill, Cat. Fish. E. Coast N. Am. 1861, 36.

Trachurus squamosus, GRONOW, Cat. Fish. (1780), ed. Gray, 1854, 125.

The Jack, or Buffalo Jack, is common, occurring also in the West

Indies and on the coast of Brazil, and the United States as far north as Cape Cod. Its habits closely resemble those of the preceding species. My largest specimen is nine inches long; the fishermen claim that the species attains the weight of five or six pounds, but they probably confound this with some other species of the same family.

Color.—Above, light slate; beneath, pearly white; snout and line over the orbit blue. Second dorsal margined with black. Base of lateral plates and tip of caudal light brown.

NAUCRATES DUCTOR, (*Linné*).

PILOT-FISH.

Gasterosteus ductor, LINNÉ, Syst. Nat. ed. 10, 1, p. 295.
Naucrates ductor, CUV. & VAL., Hist. Nat. Poiss. viii, p. 312, pl. 332.

This universally-distributed species occasionally finds its way into the hands of the Bermudian fishermen.

ZONICHTHYS FASCIATUS, (*Bloch.*) Swainson.

BONITO.

Scomber fasciatus, BLOCH, Ichth. x, 61, taf. cccxli, 17; Syst. Ichth. ed. SCHNEIDER, 29.
Seriola fasciata, CUV. & VAL., Hist. Nat. Poiss. ix, 211, 1833.—GÜNTHER, Cat. Fish. Brit. Mus. ii, 464.
Zonichthys fasciatus, SWAINSON, Nat. Hist. Fish. & Rept.—GILL, Cat. Fish. E. Coast N. Am. 1861, v, 36, and in Rep. U. S. Com. Fish. 1871, 803.
Halatractus fasciatus, POEY, Rep. Fis. Nat. Cuba, ii, 373, 1868.

Not uncommon; recorded also from Cuba and South Carolina. A specimen was taken near New York in October, 1875, and is now in the National Museum. The Bonito is an excellent table-fish, and reaches the length of two feet or more.

The "Amber-fish," the "Guelly," or "Cavally" (Caballa ?), the "Slippery Dick," and the "Skip-jack" of the fishermen probably belong to this family; but, as I secured no specimens, they cannot be identified. The "Skip-jack" is perhaps an *Oligoplites*, and the "Amber fish" is doubtless a *Seriola*.

CORYPHÆNIDÆ.

CORYPHÆNA HIPPURUS, *Linn.*

DOLPHIN.

Coryphæna hippurus, LINNÉ, Syst. Nat. ed. 12, i, 446.

I observed a Dolphin, measuring five or six feet, playing about our steamer in the Gulf Stream, about two hundred miles northwest of the Bermudas. The Dolphin is well known to the fishermen.

MULLIDÆ.

HYPENEUS MACULATUS, (*Bloch*) *Cuv.*

GOAT-FISH.

Pira metara, MARCGRAVE, Hist. &c. Brasil, 1648, 156, 181.

Mullus maculatus, BLOCH, Ichth. x, 1797, 79, tab. 348.—SCHNEIDER, Bloch, Syst. Ichth. 1801, 78.

Upeneus maculatus, CUV. & VAL., Hist. Nat. Poiss. iii, 1829, 478.—STORER, Syn. Fish. N. Am. 1846, 48.—POEY, Mem. Hist. Nat. Cuba, i, 1853, 223; ii, 1861, 367.—CASTELNAU, Anim. Nouv. &c. Amérique du Sud, Pois. 1855, 6.—GÜNTHER, Cat. Fish. Brit. Mus. i, 1861, 408.—COPE, Trans. Am. Phil. Soc. 1870, 471.

Mullhypeneus maculatus, POEY, Rep. Fis.-Nat. Cuba, ii, 1868, 307.

I did not secure a specimen, but was told that a fish of this description is common among the reefs. Godet, in his "History of Bermuda," gives a description of color which is apparently taken from specimens by him, which renders the identification sufficiently certain. The species is also recorded from Cuba, Jamaica, Martinique, and Rio de Janeiro.

BERYCIDÆ.

HOLOCENTRUM SOGO, *Bloch.*

SQUIRREL.

Jaquaraca, MARCGRAVE, Hist. &c. Brasil, 1648, 147.

Perca marina rubra, CATESBY, Nat. Hist. Carolina, Florida, and the Bahama Islands, ii, 1743, 2., tab. ii, f. 2.

Bodianus pentacanthus, BLOCH, Ichth. vii, 1797, 29, tab. ccxxxv (a badly-distorted copy of Marcgrave's figure).

Holocentrus sogo, BLOCH, op. cit. 46, tab. ccxxxii.

Holocentrum sogho, GILL, Cat. Fish. E. Coast N. Am. 41, 186; and in Baird's Rep. on Sea Fisheries of South. New England, 1873, 804.

Holocentrus rubellus laminis branchiostegis serratis etc., BROWN, Hist. &c. Jamaica, 1799, 447.

Sogo holocentrus, SHAW, Gen. Zool. v. 1803, 555.

Bodianus jaguar, LACÉPÈDE, Hist. Nat. Poiss. &c. iv, 1803, 286.

Sciæna rubra, SCHNEIDER, Bloch, Syst. Ichth. 1801, 82 (not Forskål).

Holocentrum longipinne, CUV. & VAL., Hist. Nat. Poiss. iii, 1829, 181.—STORER, Syn. Fish. N. Am. 1846, 46.—GÜNTHER, Cat. Fish. Brit. Mus. i, 1861, 28.—COPE, Trans. Am. Phil. Soc. 1870, 465.

Common; its bright color and nervous darting motions rendering it one of the most conspicuous denizens of the rock-pools. It is found

throughout the West Indies and south to Brazil. Their voracity is very great, and the tyro in angling usually finds his first prize to be a "Squirrel." They are not often eaten. They breed plentifully about the islands, and reach a length of fifteen inches; the lobes of the vertical fins becoming proportionally more and more produced with age. The local name is the same as that given by Catesby, and refers to a grunting noise uttered by them, which resembles the bark of a squirrel.

The Cuban form seems to be nearly the same; but Professor Poey hesitatingly places it in a distinct species.

SCIÆNIDÆ.

Genus PAREQUES, *Gill*, MS.*

PAREQUES ACUMINATUS, (*Schneider*) Gill.

CARRUB.

Grammistes acuminatus, Schneider, Bloch. Syst. Ichth. 1801, 184.

Eques acuminatus, Castlenau, Anim. Nouv. &c. Amérique du Sud, Poiss. 1855, 11.—Günther, Cat. Fish. Brit. Mus. ii, 1861, 280.—Poey, Mem. Hist. Nat. Cuba, ii, 1861, 370; Rep. Fis.-Nat. Cuba, ii, 1868, 325.—Cope, Trans. Am. Phil. Soc. 1870, 471.

Eques lineatus, Cuv. & Val., Hist. Nat. Poiss. v, 1830, 169.

Common here, though of rare occurrence elsewhere, having been observed only at Cuba, Santa Cruz, and Bahia; not valued for food. My specimens measure eleven inches. The name "Carrub" is inexplicable, unless it be a corruption of "Carp."

Color.—Tawny-yellow; extremities of fins and base of pectorals and ventrals blackish-brown; head blotched with the same. Two specimens have seven straight, longitudinal lines upon the side; the third is without any traces of such markings. Whether this difference is sexual, I have no means of determining. The first dorsal is one-fourth the height of the body, measured immediately below it.

* The genus *Pareques* is distinguished, according to Professor Gill, by the development of the spines of the first dorsal fin in normal number, (ten or eleven,) as well as other osteological characters.

SPARIDÆ.

CALAMUS MEGACEPHALUS, *(Swainson) Poey.*

GOAT'S HEAD PORGY.

Pagellus calamus, CUV. & VAL., Hist. Nat. Poiss. vi, 1830, 206, pl. 152.—POEY, Mem. Hist. Nat. Cuba, ii, 1861, 367.

Sparus calamus, POEY, Rep. Fis.-Nat. Cuba, ii, 1868, 308.

Calamus megacephalus, SWAINSON, Nat. Hist. Fish, ii, 1839, p. 222.—GUICHENOT, Mem. Soc. Imp. Sci. Nat. Cherbourg, xix, 1868, 112.—POEY, Ann. Lyc. Nat. Hist. x, 1874, 178.

Common; found also in the West Indies, reaching south to Bahia. My specimens measure from six to eighteen inches.

CALAMUS ORBITARIUS, *Poey.*

SHEEP'S-HEAD PORGY.

Pagellus orbitarius, POEY, Mem. Cuba, ii, 1860, 201; 1861, 367.

Sparus orbitarius, POEY, Rep. Fis.-Nat. Cuba, ii, 1868, 308.

Calamus orbitarius, POEY, Ann. Lyc. Nat. Hist., N. Y., x, 1874, 79.

Common; recorded also from Cuba. This species very closely resembles the preceding in form and habits, but is easily distinguished by the shortness of the snout, which gives it a very abrupt profile. In *S. calamus*, the diameter of the orbit is contained twice in the distance from the extremity of the snout to the perpendicular from the anterior border of the orbit; in *S. orbitarius*, once and one-half. The height of the two specimens before me is the same; and, in *S. calamus*, the height is contained in the length twice and three-quarters; in *S. orbitarius*, twice and one-half. The specimens measure sixteen and fifteen inches, respectively.

Color.—Both species, greenish-olive, with golden longitudinal stripes.

The names Goat's-head and Sheep's-head no doubt refer to the enormous pre-orbital bones which impart an ovine physiognomy to the fish. The Porgies are taken with the hook in large quantity, and rank among the most salable kinds. They live in deep water; and, when brought to the surface, their bellies are greatly expanded from the removal of pressure, giving them a very comical appearance.

SARGUS VARIEGATUS, (*Lacépède,*) *Goode.*

CHUB.

Sparus Sargus, LINNÉ, Syst. Nat. ed. 10, 1, 1758, 278; ed. 12, 1, 1766, 469.—GMELIN, Linné, Syst. Nat. 1, 1788, 1270.—BLOCH, Ichth. viii, 1797, 31, tab. cclxiv.—SCHNEIDER, Bloch, Syst. Ichth. 1801, 270.—LACÉPÈDE, Hist. Nat. Poiss. iv, 1803, 27, 77.—RISSO, Ichth. Nice, 1810, 236.

Sargus variegatus, LACÉPÈDE, op. cit. iv, 1803, 207 (from HAÜY, Encyclopédie Méthodique.)

Sargus raucus, GEOFFROY ST. HILAIRE, Descr. de l'Égypte, Poiss. 1813, pl. xviii, f. 1.

Sargus Rondeletii, CUV. & VAL., Hist. Nat. Poiss. vi, 1830, 14, pl. cxli.—VALENCIENNES. Webb & Berthelot, Hist. Nat. Canaries, Poiss. 1836, 28.—GUICHENOT, Expl. Scient. Algérie, Poiss. 1850, 46.—GÜNTHER, Cat. Fish. Brit. Mus. 1861, 44.

Very abundant; occurring in large schools in company with *Pimelepterus Boscii*, which it closely resembles in form and habits. It is strictly European, and is especially common in the Mediterranean, but has not been found west of Madeira and the Canaries. I have carefully compared Bermudian specimens with Mediterranean specimens in the Bonaparte collection labeled *Sargus Rondeletii*. The Chub is seined in vast quantities in Hamilton Harbor and other secluded bays. My specimens measure from ten to twelve inches.

PIMELEPTERIDÆ.

PIMELEPTERUS BOSCII, *Lacépède.*

BREAM.

Chætodon cyprinaceus, BROUSSONET, MS.—GMELIN, Linné, Syst. Nat. 1, 1788, 1269, note

Pimelepterus Boscii, LACÉPÈDE, Hist. Nat. Poiss. iv, 1803, 429.—CUV. & VAL., Hist. Nat. Poiss. vii, 1831, 258.—VALENCIENNES, in Webb & Berthelot, Hist. Nat. Canaries, 1836, pl. xix.—DEKAY, Zool. N. Y. Fishes, 1842, 100, pl. xx, fig. 56.—STORER, Syn. Fish. N. A. 1846, 89.—GÜNTHER, Cat. Fish. Brit. Mus. i, 1861, 497.—GILL, Cat. Fish. E. Coast N. Am. 1861, 31.—POEY, Rep. Fis.-Nat. Cuba, ii, 1868, 323.—GILL, in Baird's Rep. on Sea Fisheries of S. New England, 1873, 805.—BAIRD, Rep. Sea Fisheries of S. New England, 1873, 824.

Pimelepterus incisor, VALENCIENNES, op. cit. 805.

Common. The Bream is always found in company with the preceding species, to which it is very like in size, shape, and habits, and is taken with it in large numbers and brought to the market. It is easily distinguished from the Chub, as far as it can be seen under water, by the large black spot just behind the dorsal. It is also recorded from Madeira,

the Canaries, Jamaica, and Cuba. A single specimen was taken in the spring of 1873, at Staten Island, New York Harbor, by Mr. C. L. Copley, and sent by him to the Smithsonian Institution.

Color.—Golden-brown, with a longitudinal stripe of gold along the center of each row of scales, a silvery streak along the preorbital.

PRISTIPOMATIDÆ.

HÆMYLUM CAPEUNA, (*Lichtenstein*) *Goode.*

WHITE GRUNT.

Capeuna Brasiliensibus, MARCGRAVE, Hist. &c. Brasil, i, 1648, 155, f. 163.

Grammistes trivittata, SCHNEIDER, Bloch, Syst. Ichth. 1801, 188 (on Marcgrave's figure)

Serranus capeuna, LICHTENSTEIN, Abhandl. Berl. Akad. 1820–1, 288 (on Marcgrave's figure).

Hæmulon quadrilineatum, CUV. & VAL., Hist. Nat. Poiss. v, 1830, 288, pl. cxx.—STORER, Syn. Fish. N. Am. 1846, 75.—GÜNTHER, Cat. Fish. Brit. Mus. i, 1861, 316.—POEY, Rep. Fis.-Nat. Cuba, ii, 1868, 319.—GILL, in Baird's Rep. Sea Fisheries of S. New England, 1873, 806.

Hæmulum quadrilineatum, COPE, Trans. Am. Phil. Soc. 1870, 471.

Hæmulon quinquelineatum, POEY, Mem. Hist. Nat. Cuba, ii, 1861, 419; Rep. Fis.-Nat. Cuba, i, 1867, 310; ii, 1868, 162.

Common, occurring in schools. My specimens measure four inches. Cuvier's description of the color is excellent; but Günther, in quoting it, fails to mention, either in generic or specific diagnoses, the brilliant red of the lips and mouth, which Cuvier thought of sufficient importance to found upon it his generic name *Hæmulon*. I have made use of the specific name *capeuna*, because it seems to have priority over that usually accepted. The name *trivittata* can scarcely stand, since it is not only inapplicable, but sure to mislead, as is evident from the two other names which have been given to the species, viz, *quadrilineatum* and *quinquelineatum*.

The species is recorded from Brazil, San Domingo, and Cuba.

HÆMYLUM CHRYSOPTERUM, (*Linné*) *Cuvier.*

MARGATE-FISH.

Perca marina gibbosa cinerea (Margate-fish), CATESBY, Hist. Carolina, Florida, and Bahamas, ii, 1743, 2, pl. ii, f. 1.

Perca chrysoptera, LINNÉ, Syst. Nat. ed. 12, 1766, 485.—GMELIN, Linné, Syst. Nat. 1, 1788, 1314.

Lutjanus chrysopterus, LACÉPÈDE, Hist. Nat. Poiss. iv, 1803, 186, 226.

Hæmulon chrysopteron, CUV. & VAL., Hist. Nat. Poiss. v, 1830, 240—DEKAY, New York Fauna, Fishes, 1842, 85, pl. vii, f. 22.—STORER, Syn. Fish. N. Am. 1846, 75.—HOLLBROOK, Ichth. South Carolina, 1855, 120, pl. xvii, f. 1.—GÜNTHER, Cat. Fish. Brit. Mus. i, 1861, 313.—GILL, in Baird's Rep. Sea Fisheries of S. New England, 1873, 806.

The Margate-fish of the fishermen is probably this species. It is common in summer, but was not to be found in the markets at the time of my visit. The species is recorded from the West Indies and Brazil. The fishermen recognize several others, as the Yellow, Streaked, Spotted, and Black Grunts, all of which probably belong to this family, if not to this genus.

LUTJANUS CAXIS, (*Schneider*) *Poey.*

GRAY SNAPPER.

Caxis, PARRA, Descr. Dif. Pie. Hist. Nat. Cuba, 1787, 14, lam. viii, f. 2.

Sparus Caxis, SCHNEIDER, Bloch, Syst. Ichth. 1801, 284.

Lutjanus Caxis, POEY, Rep. Fis.-Nat. Cuba, i, 1867, 269; ii, 1868, 293.—GILL, in Baird's Report on Sea Fisheries of S. New England, 1873, 806.

Bodianus Vivanet, LACÉPÈDE, Hist. Nat. Poiss. iv, 1803, pl. iv, f. 3 (on a figure by Plumier).

Sparus tetracanthus, BLOCH, Ichth. viii, 1797, 279, 930 (on a figure of Plumier).

Cichla tetracantha, SCHNEIDER, op. cit. 338.

? *Bodianus striatus* (*Fasciatus*), SCHNEIDER, op. cit. 335, tab. lxv.

Lutjanus acutirostris, DESMAREST, Déc. Ichth. pl. ii, f. 1 (fide Cuvier).

Mesoprion griseus, CUV. & VAL., His. Nat. Poiss. ii, 1829, 471.—STORER, Syn. Fish. N. Am. 1846, 34.—GÜNTHER, Cat. Fish. Brit. Mus. i, 1861, 195.

Very common; distributed also throughout the Caribbean Sea and the Gulf of Mexico, and, according to Günther, who considers it identical with *Mesoprion goreensis* Cuv. & Val., extending east to the African coast. It breeds abundantly, and hundreds of individuals from four feet to four inches in length may be seen in almost any sheltered nook. It is one of the most delicious of food-fish, its flavor not unlike that of the Blue-fish (*Pomatomus saltatrix*). Its extreme cunning renders it very difficult to capture with either hook, pot, or grains, and has gained it the *soubriquet* of "Sea Lawyer". The market-name is "Gray Snapper".

Color.—Dark gray, changing but slightly in spirits.

The synonomy of this and the allied forms is much ensnarled, and a careful study of a full series of specimens is desirable.

LUTJANUS AYA, (*Bloch*) *Gill.*

YELTING; GLASS-EYED SNAPPER.

Acara aya, MARCGRAVE, Hist. &c. Brasil, 1648, 167.

Bodianus aya, BLOCH Ichth. 1797, 33, tab. ccxxvii (on a figure by Prince Maurice).—LACÉPÈDE, Hist. Nat. Poiss. iv, 1803, 286.

Mesoprion aya, CUV. & Val., Hist. Nat. Poiss. ii, 1829, 457.—? GUICHENOT, Sagra's Hist. Nat. Cuba, Poiss. 1845, 24.—GÜNTHER, Cat. Fish. Brit. Mus. i, 1861, 198.

Lutjanus aya, GILL, MS.

Bodianus ruber, SCHNEIDER, Bloch, Syst. Nat. ed. 1801, 330.

Common. It probably breeds, as individuals of all ages occur; the largest weigh ten pounds or more, and are much esteemed as food. Its abrupt profile and large eyes give it a very sparoid appearance; to the latter feature it no doubt owes one of its popular names, a similar epithet being applied to the large-eyed *Stizostedium americanum*, the Wall-eyed or Glass-eyed Pike of the great lakes and the Mississippi Valley. The name "Yelting" is very puzzling.

Color.—Brilliant rose-red, fading in spirits to grayish-olive, with black blotch along the base of the soft dorsal; base of pectoral deep black.*

The species is peculiarly West Indian. Large specimens are sometimes brought in winter to the Washington market, in lots from Florida.

The Schoolmaster Snapper and Silk Snapper of the fishermen probably belong to this genus. The Spot Snapper and the Yellow-tail correspond doubtless to *Mesoprion uninotatus* (Cuv. & Val.) Gill, and to *Ocyurus chrysurus* (Bl.) Gill. *Lutjanus cynodon* (Cuv.) Gill probably also occurs. All these species are peculiarly West Indian.

SERRANIDÆ.

TRISOTROPIS UNDULOSUS, (*Cuvier*) *Gill.*

ROCK-FISH.

Perca marina venenosa punctata (Rock-fish), CATESBY, Nat. Hist. Carolina, Florida, and Bahamas, ii, 1743, 15, tab. xv.—CUV. & VAL., Hist. Nat. Poiss. ii, 1829, 386.

Serranus undulosus, CUV. & VAL., op. cit. 295.—GÜNTHER, Cat. Fish. Brit. Mus. i, 1861, 143.

Trisotropis undulosus, GILL, Proc. Acad. Nat. Sci. Phila. 1865, 105.

Serranus brunneus, POEY, Mem. Hist. Nat. Cuba ii, 1860, 1314.

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* Dr. Günther, in the "Synopsis of the Species", which serves as a key to the genus places this and the preceding species under the head "*aa. Ground-color olive, with a yellow, green, or brown shade.*" This is certainly very apt to mislead, and illustrates the difficulty of drawing correct ideas from the study of distorted and discolored museum-specimens.

Trisotropis brunneus, GILL, l. c.—POEY, Rep. Fis.-Nat. Cuba, ii, 1868, 156, 234; Annals Lyc. Nat. Hist. N. Y. ix, 1870, 305.

Serranus arara, POEY (not CUV. & VAL.), Mem. ii, 1860, 132.

Serranus decimalis, POEY, Mem. ii, 1860, 138.

Serranus cyclopomatus, POEY, Mem. ii, 1861, 353; Rep. ii, 1868, 284.

Serranus latepictus, POEY, Mem. ii, 1861, 353.

Very common; recorded also from the West Indies and the coast of Brazil. The Rock-fish attains the length of four or five feet, and is one of the choicest of table-fishes, though Catesby declares that his "Rock-fish", which seems most probably the same, "has the worst character for its poisonous quality of any other among the Bahama Islands".

Color.—Brown, thickly mottled with large, irregularly quadrilateral spots of brownish-violet. The sides of the head are marked with wavy, irregular lines of deep violet. Dorsal broadly margined with black; caudal, anal, and ventral tipped with deep black, which gradually shades into the color of the body; pectorals tipped with orange.

It may be regarded as somewhat doubtful whether the species of Cuvier is identical with that whose diagnosis is given by Dr. Günther under the same name, since the former makes no allusion to the yellow tips of the pectorals. Professor Poey, after an examination of one of Cuvier's types, pronounces it distinct from his *Serranus brunneus* by reason of a slightly-rounded caudal. The *Serranus undulosus* defined by Günther coincides with Poey's *Serranus brunneus* in its truncated caudal and in other respects. I have provisionally accepted Günther's identification of Cuvier's species. Catesby's figure disagrees in its slightly-forked caudal, but in other respects corresponds with the specimen before me; and, since no conjecture has been offered as to its relations, I have, after making allowances for the carelessness which the artist manifests in many of the other plates, ventured to refer it to the same species.

TRISOTROPIS GUTTATUS, (*Schneider*) *Gill.*

RED ROCK-FISH.

Roncador cardenal, PARRA, Descr. Dif. Piez. His. Nat. Cuba, 1787, 29, lam. xvi, f. 1.

Johnius guttatus, SCHNEIDER, Bloch. Syst. Ichth. 1801, 77 (on Parra's figure).

Trisotropis guttatus, GILL, Proc. Acad. Nat. Sci. Phila. 1863, 105.

Serranus cardinalis, CUV. & VAL., His. Nat. Poiss. ii, 1829, 373 (on Parra's figure).—STORER, Syn. Fish., N. Am., 1840, 27.—GÜNTHER, Cat. Fish. Brit. Mus. i, 1861, 57, note 13.—POEY, Rep. Fis.-Nat. Cuba, i, 1867, 200.

Trisotropis cardinalis, POEY, op. cit. ii, 282; Annals Lyc. Nat. Hist. N. Y. ix, 1870, 303.

Serranus rupestris, CUV. & VAL., op. cit. ix, 1833, 457.—STORER, op. cit. 29.—GÜNTHER, op. cit. 145.

With some doubt I refer to this species the Red Rock-fish of the Bermuda market. In habits, form, and dimension, it much resembles the preceding. It is recorded from Saint Bartholomews, Cuba, and San Domingo, and at the latter place is called by the same name as in Bermuda.

EPINEPHELUS STRIATUS, (*Bloch*) *Gill.*

HAMLET; GROUPER.

Cherna, PARRA, Desc. Dif. Piez. Hist. Nat. Cuba, 1787, 50, lam. xxiv.

Anthias striatus, BLOCH, Ichth. ix, 1797, 103, tab. 324 (on a figure by Plumier).

Lutjanus striatus, LACÉPÈDE, Hist. Nat. Poiss. iv, 1803, 324.

Serranus striatus, CUV & VAL., Hist. Nat. Poiss. ii, 1829, 288.—STORER, Syn. Fish. N. Am. 1846, 27.—GUICHENOT, Sagra's Hist. Nat. Cuba, Poiss. 1850, 12.—GÜNTHER, Cat. Fish. Brit. Mus. i, 1861, 110.

Epinephelus striatus, GILL, Proc. Acad. Nat. Sci. Phila. 1865, 105.—POEY, Rep. Fis. Nat. Cuba, ii, 1868, 285.—COPE, Trans. Am. Phil. Soc. 1870, 466.

Anthias cherna, SCHNEIDER, Bloch, Syst. Ichth. ed. 1801, 310 (on Parra's figure).

Sparus chrysomelanurus, LACÉPÈDE, op. cit. 160. (on a bad copy of Plumier's figure).

Very common; found also throughout the Caribbean Sea and the Gulf of Mexico. The Grouper attains an enormous size; and, on account of its abundance and the ease of capturing, it is used as food more than any other species. Its flesh is rather inferior in flavor and coarse in texture, especially that of large individuals. Great numbers are caught off the islands, and are brought in the wells of the smacks to the artificial ponds along the shore, where they are kept for the market, and are fed on fish and lobsters.

The "Devil's Hole" is a large natural pool near the center of the main island, and about one hundred feet from the south shore of Harrington Sound. Here a large number of Groupers may usually be found confined, and the place is much visited by strangers. At feeding-time, when one looks into the clear waters of the pool, nothing can be seen but an array of great open mouths. When the food is thrown in, a scene of indescribable commotion and splashing ensues. They are very fierce, and rush savagely at anything which looks eatable. I have seen two large ones, each four feet in length, seize the opposite ends of a cuttle-fish arm tugging for several minutes at the tough morsel before the question of ownership could be decided.

The young fish are called Hamlets; but, after reaching a length of eighteen or twenty inches, are known as Groupers; the latter name is a corruption of the Portuguese *Garoupa*, which is applied to a similar fish found at Madeira.

Color.—Adult fishes range from a light-slate color to a deep chestnut-brown. In some individuals a narrow band of black extends from the tip of the snout to a point between the eyes, where it divides; the branches extending, one to the origin of the dorsal and the other to the angle of the operculum, and upward to unite with the first at the origin of the dorsal. The lips and throat are bright vermilion.

A great variation is apparent in the color of different individuals, which has not yet been satisfactorily explained, though it is no doubt due to the depth of water or color of the bottom in the place where they are taken, as is suggested below under *Enneacentrus punctatus*. The fishermen claim that the color of individuals confined in the ponds changes from one extreme to the other within the period of a few weeks. I have myself seen very considerable variation in color in the course of a week in fishes confined in shallow fish-ponds. The young fish are always slate-color and are also marked with six or seven broad, transverse bands of light brown and a large quadrangular black blotch across the back of the tail behind the dorsal.

EPINEPHELUS GUTTATUS, (*Gmelin*) *Goode.*

HIND.

? *Cugupuguaca*, MARCGRAVE, Hist. &c. Brasil, 1648, 169.—SLOANE, Voyage aux Îles de Madère, des Barbades, de St. Christophe, et de la Jamaique, 1727, tab. ccxlvii.—

Cugupuguacu Brasil, CATESBY, Nat. Hist. Carolina, Florida, and Bahamas, ii, 1743, 14, tab. xiv (the Hind).

Perca guttata, GMELIN, Linné, Syst. Nat. 1, 1788, 1315 (on a figure by Catesby).—CUV. & VAL., Hist. Nat. Poiss. ii, 1828, 372.

Bodianus apua, BLOCH, Ichth. vii, 1797, 37, tab. ccxxix (on a figure by Prince Maurice).—LACÉPÈDE, Hist. Nat. Poiss. iv, 1803, 296.

? *Serranus apua*, CUV. & VAL., op. cit. 287 (citing as a synonym *Piratiapia*, MARCGRAVE, op. cit. 158).

Serranus apua, GÜNTHER, Cat. Fish. Brit. Mus. i, 1861, 140.

Bodianus marginatus, SCHNEIDER, Bloch, Syst. Ichth. 1801, 331.

Very common; recorded also from Jamaica, and probably from Brazil. The Hind is readily sold in the market, where specimens two feet in length are sometimes seen.

The name Hind perhaps refers to the spotted markings as similar to those of the deer. The name is found in nearly all the English West Indian islands, applied to the spotted species of this family.

Color.—Brownish, red, or rosy-white, with numerous small circular spots of deep rose-color, fading to brown in spirits. Vertical fins broadly margined with black.

The Hind is subject to great variations of color, specimens from the "white water", where there is a bottom of white sand, being nearly white, while others have the ground-color a dusky reddish-brown.

The descriptions of Gmelin and Bloch were both founded upon drawings, and their relations are somewhat doubtful. The former has been preferred, since the figure of Catesby agrees precisely with the Bermuda "Hind", except in the smaller number of dorsal spines, a matter of detail not likely to have been noticed by Catesby, judging from his other figures. The Bermudian form is much more likely to be identical with that from the Bahamas and Jamaica than that from Brazil, if, indeed, they are not all identical. Günther records from Jamaica his *Serranus apua*, which is, beyond a doubt, the Bermuda species, thus furnishing another argument for its identity with that figured by Sloane.

ENNEACENTRUS PUNCTATUS, (*Linné*) *Poey*.

BUTTER-FISH or CONEY (*yellow variety*); NIGGER-FISH (*red variety*).

Carauna, MARCGRAVE, Hist. &c. Brasil, 1648, 147.—LICHTENSTEIN, Abhandl. Akad. Berl. 1820-1, 278.

Perca marina puncticulata (Negro-fish), CATESBY, Nat. Hist. Carolina, Florida, and Bahamas, ii, 1743, 7, pl. vii.

Perca punctata, LINNÉ, Syst. Nat. ed. 10, i, 1758, 291; ed. 12, 1766, 485 (on Catesby's figure).

Enneacentrus punctatus, POEY, Rep. Fis.-Nat. Cuba, ii, 1868, 288.

Guativere, PARRA, Descr. Dif. Piez. Hist. Nat. Cuba, 1787, 7, lam. v, f. 1, 2.

Holocentrus auratus, BLOCH, Ichth. vii, 1792, 57, tab. ccxxxvi.—SCHNEIDER, Bloch, Syst. Ichth. 1801, 314.

Gymnocephalus ruber, SCHNEIDER, op. cit. 346, tab. lxvii (on a figure by Prince Maurice).

Serranus ouatalibi, CUV. & VAL., Hist. Nat. Poiss. ii, 1829, 381.—STORER, Syn. Fish. N. Am. 1846, 56.—GUICHENOT, Sagra's Hist. Nat. Cuba, Poiss. 1845, 15.—MÜLL. & TROSCH., Schomburgh's Hist. Barbados, 1848, 665.—GÜNTHER, Cat. Fish. Brit. Mus. i, 1861, 120.—POEY, op. cit. 202.—COPE, Trans. Am. Phil. Soc. Phila. 1870, 446.

Epinephelus ouatalibi, GILL, Proc. Acad. Nat. Sci. Phila. 1865, 105.

Bodianus guativere, SCHNEIDER, Syst. Ichth. Bloch, 1801, 336 (on Parra's figures).

Serranus guativere, CUV. & VAL., op. cit. 383 (limited to Parra's f. 2).—STORER, l. c.—MÜLL. & TROSCH., l. c.—COPE, l. c.

Serranus carauno, CUV. & VAL., op. cit. 384 (on a drawing by Prince Maximilian).—CASTELNAU, Anim. Nouv. ou Rares, Amérique du Sud, Poiss. 1, pl. 1, fig. 1.

Common; recorded also from the West Indies, Brazil, and the Cape Verde Islands. Its small size and the softness of its flesh render it of little economic value. In this species, as in the preceding, the range of color is very great; some individuals are orange-yellow, with blue

spots confined to the head and anterior part of the body; others are red, slightly dingy above, and thickly studded throughout with black dots, each of which has a blue center. The specimens examined were not very fresh; and, from the rapidity with which the colors change, I can readily believe that in life they were as brilliant as is indicated in the description of Cuvier.* The yellow form corresponds to the typical *Perca punctata* or *Serranus guativere*, and is known as the Butter-fish or Yellow Coney; the red form corresponds to *Serranus ouatalibi*, and is known as the Nigger-fish.

Professor Poey suggests that the former inhabits shallow and the latter deep waters, and thus explains the variations of color. These would seem, however, to depend more upon the color of the bottom than upon the depth. On the coast of Maine, the bright-red variety of the Cod (*Gadus morrhua*, Linné) is found only on bottoms covered with Red Algæ, such as *Ptilota serrata*, *Delesseria sinuosa*, and *Rhodymenia palmata*.

The names Butter-fish and Nigger-fish are in use also at Barbados, Saint Thomas, and the Bahamas, as applied to this and an allied species. The first refers to the color and soft, oily feeling of the yellow variety; the latter probably also to color.

The Black Hind, Prickly Hind, and Black Coney are probably allied species, but not having seen them I can only surmise their character.

A "Soap-fish" also occurs, probably either *Rhypticus saponaceus* (Bloch) Cuvier, or *Promicropterus maculatus* (Holbrook) Gill.

HYPOPLECTRUS PUELLA, (*Cuvier*) *Gill.*

CATAPHEBE.

Plectropoma puella, CUV. & VAL., Hist. Nat. Poiss. ii, 1829, 405, pl. xxxvii.—GUICHENOT, Sagra's Hist. Nat. Cuba, Poiss, 1845, 18.—STORER, Syn. Fish. N. Am. 1846, 31.—POEY, Mem. Hist. Nat. Cuba, i, 1852, 62, lam. ix, f. 2.—GÜNTHER, Cat. Fish. Brit. Mus. i, 1861, 165.

Hypoplectrus puella, GILL, Proc. Acad. Nat. Sci. Phila. 1862, 236.—POEY, Rep. Fis.-Nat. Cuba, ii, 1868, 290.

Plectropoma vitulinum, POEY, Mem. Hist. Nat. Cuba, i, 1852, 68.

Common in the rock-pools; recorded also from Martinique and Jamaica. My specimen measures three inches. The name seems to be peculiar to Bermuda, and its origin is not apparent.

Color.—Olive, with six violet-black cross-bands; the third very broad and conspicuous and below the fourth and tenth dorsal spines. A line

* Cuvier and Valenciennes, Histoire Naturelle des Poissons, ii, 38[illegible]

around the orbit, another from posterior nostril across anterior edge of orbit to lower limb of preoperculum, then broken, then continued to base of ventral; and two others across the operculum; the anterior extending over the base of pectoral to belly, blue. Several blue spots between the orbit and snout. Fins yellowish.

ECHENEIDIDÆ.

Fishes of this family are freqently taken, clinging to sharks or to the shells of turtles.* The sharks thus encumbered are frequently much emaciated. *Leptecheneis naucrates* (Linn.) Gill, *L. naucrateoides* (Zuiew) Gill, and *Ptheirichthys lineatus* (Menz.) Gill are probably the most common species of "Suck-fish" found here.

SPHYRÆNIDÆ.

SPHYRÆNA SPET, (*Haüy*) *Goode.*

BARRACUDA.

Esox dorso dipterygio LINNÉ, Mus. Ad. Fried. ii. 1754, 100.

Esox sphyræna, LINNÉ, Syst. Nat. ed. 10. i, 1758, 313, ed. 12; i, 1766, 115; GMELIN, Linné, Syst. Nat. i, 1788, 1389.—BLOCH, Ichth. xi, 1797.

Sphyrna sphyræna, BLOCH, Ichth. 1797, taf. cccIxxxix.—SCHNEIDER, Bloch, Syst. Ichth. 1801, 109.—RISSO, Ichth. Nice, 1810, 332.

Esox spet, HAÜY, Encyclopédie Méthodique, iii, Poissons, 7187.

Sphyræna spet LACÉPÈDE, Hist. Nat. Poiss. v, 1803, 326-8.—? BONAPARTE, Iconografia della Fauna Italica, iii, Pesci, plate with part 152.

Sphyræna becuna, LACÉPÈDE, op. cit. 327-9, pl. ix, f. 1.—CUV. & VAL., Hist Nat. Pois. iii, 1829, 340 (part); and vii, 1831, 507.

Sphyræna vulgaris, CUV. & VAL., op. cit. iii, 1829, 327.—GÜNTHER, Cat. Fish. Brit. Mus. ii, 1861, 334.

Sphyræna viridensis, CUV. & VAL., sc., op. cit. 339.

Common; frequently found in the markets, and eaten with impunity, as far as I could learn. My specimens measured nearly two feet, and it is said to attain a much greater size. This is not the Barracuda of the West Indies, but the common species of the Mediterranean known by the Spanish as *Espeto* and by the Italians as *Sfirena* and *Luzzo*. Its occurrence so far west has, I believe, never before been observed. Günther

* All four species of the pelagic turtles of the Atlantic are common, and were observed by me, viz:—*Sphargis coriacea*, *Chelone mydas*, *Eretmochelys imbricata*, and *Thalassochelys caouana*. These, with a small saurian, *Eumeces longirostris*, Cope, make up the reptilian fauna of the Bermudas.

considers the *Sphyræna borealis* of DeKay,* described from specimens eight inches long taken in New York Harbor, to be the same. This might be inferred from the somewhat loose language of the description; but the figure shows it to be closely allied to, if not identical with, *Sphyræna picuda*. The origin of the first dorsal is shown by the artist to be situated almost directly above the extremity of the pectorals and far in front of the middle of the fish. The locality, New York, given by Dr. Günther for his specimen "purchased of Mr. Brandt" must, I fear, be placed in the same category with that of Lake Champlain given for specimens of *Chilomycterus geometricus* and *Tetrodon turgidus*,† and with some of the cases of reptiles described as North American by Duméril and Bibron from collections professedly North American.

SPHYRÆNA PICUDA, *Schneider.*

SENNET.

Barracuda, SLOANE, Voyage aux îles de Madère et de la Jamaique, ii, 1727, 185, pl. ccxlvii, f. 3.

Umbla minor marina maxillis longioribus (Barracuda), CATESBY, Hist. Carolina, Florida, and the Bahamas, ii, 1743, 1, tab. 1.

Picuda, PARRA, Descr. Dif. Piez. Hist. Nat. Cuba, 1787, 90, lam. xxxv, f. 2.

Sphyræna sphyræna, var. *picuda*, SCHNEIDER, Bloch, Syst. Ichth. ed. 1801, 110, tab. xxix, f. 1.—MÜLLER & TROSCHEL, Schomburgk's Hist. Barbados, 1848, 667.—GÜNTHER, Cat. Fish. Brit. Mus. ii, 1861, 336.

Esox barracuda, SHAW, Gen. Zool. v, 1804, 105.

Sphyræna barracuda, CUV. & VAL., Hist. Nat. Poiss. iii, 1829, 343, pl. lxvi.—STORER, Syn. Fish. N. A. 1846, 47.—MÜLLER & TROSCHEL, l. c.—COPE, Trans. Am. Phil. Soc. Phila. 1870, 472.

Common; breeding plentifully. The young may be seen basking in the sun in the shallows, where they are seined in large numbers. My largest specimens measured over two feet in length. Both this and the preceding species are eaten with impunity, though the former is regarded with suspicion on the Mediterranean and the latter has to answer for several well-attested cases of *ciguatera*, though in some of the West India Islands it is eaten freely.

The popular name is also in use at Barbados, where it is applied to the same or an allied species. Schomburgk spells it *Sinnet*.

The species of this genus are not yet very accurately defined. Professor Cope‡ takes exception to the supposed identity of *S. picuda* and

* Zoology of New York, Fishes, 39, pl. lx, f. 196.

† Cat. Fish. Brit. Mus. viii, 285.

‡ Proc. Amer. Phil. Soc. Phila. 1870, 472.

S. barracuda. The latter may be easily distinguished from the preceding by observing the situation of the first dorsal. In *S. spet*, this begins in the middle of the body and far behind the extremity of the pectorals; in *S. picuda*, on the anterior half of the body and above the extremity of the pectorals. The first is much the slenderer, and has nearly double the number of scales in the lateral line.

TRACHYPTERIDÆ.

REGALECUS GLADIUS, (*Walbaum*) *Cuv. & Val.*

Spada marina, IMPERATI, 587.
Cepola gladius, WALBAUM, Artedi Gen. Pisc. iii, 1792, 617.
Regalecus gladius, CUV. & VAL., Hist. Nat. Poiss. x, 1835, 352, pl. ccxcviii—GÜNTHER, Cat. Fish. Brit. Mus. iii, 1861, 308.—HUTTON, Fishes of New Zealand, 35.
Gymnetrus longeradiatus, RISSO, Hist. Nat. Eur. Merid. iii, 1827, 296.
† *Gymnetrus capensis*, CUV. & VAL., op. cit. 376.
Regalecus Jonesii, NEWMAN, Zoologist, 1860, 7019.

This is the great "Sea-serpent" which came ashore at Hungary Bay in the winter of 1860, the capture of which has been recorded by Mr. J. Matthew Jones.*

Portions of this specimen, which measured 16 feet and 7 inches in length, are preserved in the British Museum.

This specimen is thought by Günther to "probably belong" to the species given above. The well-identified specimens of the species are all from the Mediterranean, the largest 9½ feet long, while the relations of the specimens from New Zealand and the Cape of Good Hope are conjectural. The data are not sufficient to warrant the adoption of Newman's species, founded on the Bermuda specimen as a good one.

MUGILIDÆ.

MUGIL LIZA, *Valenciennes.*

MULLET.

Mugil liza, CUV. & VAL., Hist. Nat. Poiss. xi, 1836, 86.—JENYNS, Zool. Voyage H. M. S. Beagle, Fish, 80.—GÜNTHER, Cat. Fish. Brit. Mus. iii, 1861, 423.—POEY, Rep. Fis.-Nat. Cuba, ii, 1868, 388

Very common, especially in Hamilton Harbor and other shallow bays; breeding. They are seined, and brought to market in large numbers.

* Bermuda Royal Gazette, Jan. 24 and Jan. 31, 1860.—Proc. Zool. Soc. London, 1860, 185.

I have some hesitation in referring the Bermuda Mullet to this species, though it appears to be identical with that taken at Bahia Blanco and Monte Video by Darwin and described by Jenyns.* Poey considers his *Mugil lebranchus*† separated from this species by characters of doubtful value.

BELONIDÆ.

The Hound-fish of the fishermen is a *Belone;* but as I could get no specimens for careful examination, it is not possible to say to which of the nineteen West India species it belongs, or whether two or three species are not confounded under the same name.

SCOMBERESOCIDÆ.

HEMIRHAMPHUS PLEII, *Valenciennes.*

GAR-FISH.

Hemirhamphus Plcii, CUV. & VAL., Hist. Nat. Poiss. xix, 21, 1846.—GÜNTHER, Cat. Fish. Brit. Mus. vi, 268.—COPE, Trans. Am. Phil. Soc. Phila. 1870, 481.

Common; recorded also from various points in the West Indies and from Bahia. The Gar-fish occurs in enormous schools, and is seined in quantity for the market. I observed two sizes, the smallest averaging eight inches, the larger twenty inches. The fish of different sizes swam in separate schools.

The name *Gar*, applied so indiscriminately to fishes with long slender beaks, is probably the old Saxon word *gar*, which means a weapon, a lance. The name Half-beak usually given to fishes of this family is much more appropriate.

EXOCŒTUS EXILIENS, *Gmelin.*

Exocœtus exiliens, GMELIN, Linné, Syst. Nat. 1, 1788, 1400.—CUV. & VAL., Hist. Nat. Poiss. xix, 1846, 114.—RICHARDSON, Fauna Boreali-Americana, iii, 129.—GÜNTHER, Cat. Fish. Brit. Mus. vi, 1861, 291.—GILL, in Baird's Rep. on Sea Fisheries of Southern New England, 809.

Exocœtus fasciatus, LESUEUR, Journ. Acad. Nat. Sci. Phila. ii, 1821, 8, pl. iv, f. 2.

A single specimen was brought me March 1 by some negro fishermen who had caught it in Hamilton Harbor by holding a tin pail ("kettle") under it when it leaped from the water. I kept it alive for some hours,

* Zool. Voyage H. M. S. Beagle, Fish, 1842, 80.

† Memorias sobre la Historia Natural de la Isla de Cuba * * * ii, 1861, 260, tab. 18, *f. 3; Rep.* Fis.-Nat. Cuba, ii, 1868, 388.

and had an opportunity to observe its motions. Its favorite position was on the bottom of the dish, where it would remain with its pectorals and ventrals widely expanded, looking very like a large butterfly sunning itself on a flower. When disturbed, it would fold its fins close to the sides of its body, and swim about with great velocity by rapid, long, sweeping strokes of the tail and posterior half of the body. The extent to which it flexed its body was quite remarkable, almost reminding one of the motions of a Shark. When much excited, it would rise into the air with a sudden spring, its pectorals and ventrals expanded, seeming to have no difficulty in leaving the water in a space less than a foot in diameter: I am inclined to believe that the impetus from the action of the caudal is all that is used in leaving the water, and that the motion of the pectorals in flying-fishes is not begun until the fish is fairly in the air. It seemed very timid and watchful, and any quick motion of the hand within its sight would start it into rapid, nervous action.

The figures given by Lesueur and Edwards* are very accurate; but all published descriptions fail to mention the most striking character, viz, the deep notch in the membrane between the second and third pectoral rays, which seems the more apparent from the fact that the second ray is longer than the third, and projects in a spine-like process; the membrane between the third and fourth rays is slightly emarginate. The fourth ray is much the longest and the rays posterior to that regularly decrease in length.

The Bermuda fishermen recognize two kinds of flying-fish, the pelagic variety and this, which they believe to live among the sea-weed and seldom leave the water. The specimens of this species on record are all quite small: Gmelin describes his as "*at vix digito longior*"; Lesueur's was three inches long; Valencienne's was "*petite*"; and Edwards's figure indicates that his was diminutive. They may prove to be the young of some other species; but this is not probable, since no other form has pectorals of such peculiar form. The absence of barbels, if this be a character of immature *Exocœtidæ*, is also noteworthy.

A detailed description is given below:—

Radial formula: D. 12; A. 12; P. 18; V. 6; L. lat. 48.

The body is slender, its height being less than one-eighth (0.12) of the total length. Viewed from above, its outline is that of a narrow wedge, with its base at the nape and its apex at the extremity of the lower caudal lobe. The greatest width of the body is at the nape, where it is

* Gleanings in Natural History, pl. ccx.

equal to the greatest height, which occurs at the same point. The length of the head is one-sixth (0.17) of total length, and its greatest width equals that of the body. The orbit is circular, and its diameter equals the interorbital space, which is half the length of the head. The snout is very short, equaling one-sixth the length of the head; the lower projects far beyond the upper jaw. The interorbital space is deeply concave. The dorsal and anal fins begin at a point slightly behind the middle of the body, and are nearly alike in shape and in the length of the base and of the longest rays. The pectorals measure three-fifths (0.58) of the total length, extending nearly to the base of the caudal fin. The first ray is half as long as the second, which projects far beyond the margin of the membrane in a spine-like process; the third ray equals the second, while the fourth is much longer. The membrane between the second and third rays is deeply, between the third and fourth slightly, emarginated. The rays succeeding the fourth gradually decrease in length. The ventrals begin slightly in advance of the middle of the body, in length equaling a third (0.31) of total length. The five posterior rays are bifid nearly to the base. The tips of ventral and pectoral fins are equidistant from the snout. The upper lobe of the caudal measures two-thirds the length of the lower lobe.

Color.—Back bluish, shading into the silvery white of the belly; five broad lateral transverse bands. The snout transparent white. Two yellow spots upon the nape. Pectorals and ventrals black at base and at margin, and with broad, irregular bands and blotches of black and dark blue; where unspotted, clear, colorless, and transparent. Caudal lobes each with a terminal spot of black; the lower with spot of same color on its outer margin half-way from the body to its extremity.

Extreme length, 0m.073	100
Body:	
Greatest height	.12
Greatest width	.12
Height at ventrals	.10
Height of tail behind dorsal fin	.06
Head:	
Length	.17
Distance from snout to nape	.15
Greatest width	.12
Width of interorbital area	.10
Length of snout	.03
Eye:	
Diameter	.06

Dorsal:	
Distance from snout	.56
Length of base	.13
Greatest height	.13
Anal:	
Distance from snout	.56
Greatest height	.14
Caudal:	
Length of upper rays	.15
Length of lower rays	.23
Pectoral:	
Distance from snout at upper axilla	.16
Length	.58
Distance of tip from snout	.80
Ventral:	
Distance of base from snout	.45
Length	.32
Distance of tip from snout	.78

The *Exocœtus exiliens* of Bloch is totally different.

I observed numerous specimens of the pelagic species in the vicinity of the islands, both on going and return. I take from my note-book some observations on their flight.

"*February* 10, 1871.—Several flying-fishes were observed on approaching the islands; usually they were single, but often a school of half a dozen or more started out from under the side of the brig. The distance of flight varied from six to one hundred yards. When they leave the water, the pectorals assume a rapid vibration, reminding one of the flight of a grouse, the tail also rapidly vibrating. The fins soon assume a rigid position, and the fish rises over the crests and falls in the trough of the waves, following their motion; sometimes it dashes through the crest, and on re-appearing the fins are again in motion. They seem unable to fly except in a straight line (I afterwards saw them veering considerably from a straight line, taking a direction nearly at right angles with their first course), but are not dependent on the direction of the wind. The motion is very bird-like, but the illusion is dispelled by the decidedly piscine splash with which the fish plunges into the water. It was a truly beautiful sight as the fishes emerged from the waves, their silvery fins quivering and glistening in the light."

I am convinced that at the moment the fish leaves the water the mode of propulsion changes from a true swimming motion to a true flying motion. The leap with which it leaves the water is due to the former, and is analogous to the spring from the ground or from a perch, made by some birds in the act of taking wing.

CYPRINODONTIDÆ.

FUNDULUS BERMUDÆ, *Günther.*

Fundulus Bermudæ, GÜNTHER, Ann. & Mag. Nat. Hist., 1874.

Very common in the brackish water of the swamps and in ditches. Attains the length of four inches.

SYNODONTIDÆ.

SYNODUS LACERTA, (*Valenciennes*) *Goode.*

SNAKE-FISH.

Salmo Saurus, LINNÉ, Syst. Nat. 2 ed. 11, 511, 1766; Gmelin, Syst. Nat. 1, 1376.

Saurus lacerta, CUV & VAL., Hist. Nat. Poiss. xxii, 463, 1849 (not Risso).

Saurus griseus, LOWE, Trans. Zool. Soc. ii, 188, 1841.—GÜNTHER, Cat. Fish. Brit. Mus. v, 395.

A specimen, seventeen inches long, was taken off the "ducking-stool" in March, by a line fisherman. Its occurrence in this part of the Atlantic is very novel, but it agrees closely with a specimen of *Saurus griseus* sent to the United States National Museum by Dr. Günther. Its color was dusky-gray above, yellow below. Its formulæ are as follows:—

Branchiostegals, 16–17 (on opposite sides). D. 12; A. 12. Lateral line, 60. Transverse line, $\frac{3\frac{1}{2}}{6}$.

ELOPIDÆ.

MEGALOPS THRISSOIDES, (*Bloch*) *Günther.*

TARPUM.

Camaripucuagu, MARCGRAVE, Hist. &c. Brasil, 1648, 179.

Clupea cyprinoides, BLOCH, Ichth., xii, 1797, 24, tab. cccciii.

Clupea thrissoides, SCHNEIDER, Bloch, Syst. Ichth. 1801, 424.

Megalops thrissoides, GÜNTHER, Cat. Fish. Brit. Mus. vii, 1868, 472.—GILL, in Baird's Rep. on Sea Fisheries of Southern New England, 1873, 810.

Clupea apalike, HAÜY, Encyclopédie Méthodique.—LACÉPÈDE, Hist. Nat. Poiss. v, 1803, 425, 461.

Clupea gigantea, SHAW, Gen. Zool. v, 1803, 173.

Megalops atlanticus, CUV. & VAL., Hist. Nat. Poiss. xix, 1846, 398.—MÜLLER & TROSCHEL, Schomburgk's Hist. Barbados, 1848, 676.—POEY, Rep. Fis.-Nat. Cuba, ii, 1868, 423.

Extremely rare; a [illegible] that long was shown me in the collec[illegible] species.

is recorded from the Gulf of Mexico, Demerara, Trinidad, Guadaloupe, Santo Domingo, Porto Rico, Martinique, and Cuba.

The species is very abundant on the eastern coast of Florida and in the Saint John's River, where it is known as the Jew-fish. Several specimens were taken on the southern coast of New England and New York in 1874.

The name is inexplicable, but may have some connection with the name "Caffum", which is given to the same fish in Barbados.

CLUPEIDÆ.

SARDINELLA ANCHOVIA, *Valenciennes.*

ANCHOVY.

Sardinella anchovia, CUV. & VAL., Hist. Nat. Pois. xx, 1847, 269.
Clupea anchovia, GÜNTHER, Cat. Fish. Brit. Mus. vii, 1868, 421.

I refer with some doubt to this species a small fish which occurred in great schools during the month of March, and were seined together with *Decapterus punctatus*, and sold in quantities along the quay. Their average length was about five inches.

HARENGULA MACROPHTHALMA (*Ranzani*).

PILCHARD.

Clupea macrophthalma, RANZANI, Novi Commentarii Acad. Scient. Inst. Bononiensis, v, 1842, 320, tab. xxiii.—GÜNTHER, Cat. Fish. Brit. Mus. vii, 1868, 421.—COPE, Trans. Am. Phil. Soc. Phila. 1870, 483.

Harengula sardina, POEY, Mem. Hist. Nat. Cuba, ii, 1863, 310; Rep. Fis.-Nat. ii, Cuba. 1868, 418.

Common; also recorded from various islands in the West Indies. Great quantities were seined during the month of March, and sold from row-boats at the water's edge. Their average length was nine inches. Poey's *Harengula sardina* appears to be the same. The name is derived from England, where an allied species, *Clupea pilchardus*, Walbaum, is commonly known as "the Pilchard".

OPISTHONEMA THRISSA, (*Linné*) *Gill.*

HERRING.

Clupea minor, radio ultimo pinnæ dorsalis longissimo, BROWN, Civ. and Nat. Hist. Jamaica, 1756, 443.

? Clupea corpore ovato, LINNÉ, Amœn. Acad. v, 251.

Clupea thrissa, LINNÉ, Syst. Nat. ed. 10, 1, 1758, 318; ed. 12, 1, 1750, 524; GMELIN, Linné, Syst. Nat. 1, 1788, 1405 (part).—BROUSSONET, Ichth. 1, tab. x.—†BLOCH, Ichth. xii, 1797, 27, taf. cccciv (from a drawing by Plumier).—SCHNEIDER, Bloch, Syst. Ichth. ed. 1801, 424.—GÜNTHER, Cat. Fish. Brit. Mus. vii, 1868, 432.

Meletta thrissa, CUV. & VAL., Hist. Nat. Poiss. xx, 1847, 380.

Opisthonema thrissa, GILL, Proc. Acad. Nat. Sci. Phila. 1861, 37; Cat. Fish. E. Coast N. Am. 1861, 54; and in Baird's Rep. on Sea Fisheries of S. New England, 1873, 811.

Opisthonemus thrissa, POEY, Rep. Fis. Nat. Cuba, ii, 1886, 419.

Clupanodon thrissoides, SPIX, MÜLL., & TROSCH., Schomburgk's Hist. Barbados, 1848, 676.

Megalops thrissoides, AGASSIZ, in Spix's Selecta Gen. et Spec. Pisc. Brazil, 1829, 45, pl. xxii.

Megalops oglina, LESUEUR, Journ. Acad. Nat. Sci. Phila. 1, 1817, 359.

Chatoessus oglina, GRIFFITH, Cuvier's Animal Kingdom, x, 1835, 439.—DEKAY, New York Fauna, Fishes, 1842, 265.—STORER, Syn. Fish. N. Am. 1846, 209.

Chatoessus signifer, DEKAY, op. cit. 264, pl. xli, f. 132.—STORER, op. cit. 210.—BAIRD, Fishes of New Jersey Coast, 1855, 35.—JONES, Naturalist in Bermuda, 103.

Chatoessus cumorphus, GOSSE, Naturalist's Sojourn in Jamaica, 1851, 290 (notes).

This species was taken in great numbers during the month of March. They occurred in schools in two distinct sizes; the smaller, perhaps the young of the previous year, measured four inches on an average; the adults, ten. The species is common in the West Indies, and has been taken as far north as Newfoundland.

ENGRAULIDIDÆ.

ENGRAULIS CHŒROSTOMUS, *Goode.*

HOG-MOUTH FRY.

Engraulis chœrostomus, GOODE, Amer. Journ. Science and Arts, viii, 1874 (Aug.), 125.

Common in the bays in large schools; used extensively for bait. Its enormous mouth has given it the name of "hog-mouth fry."

This species closely resembles *Engraulis surinamensis* (Blkr.) Günther, differing from it, however, in several respects. The height of the body (0.16) is a little greater than two-thirds of the length of the head, and is contained six times in the total length, and slightly more than four times in the length to the end of middle caudal rays (0.90); the height at the ventrals is less (0.13). The scales are large, in thirty-eight oblique rows between the head and the caudal. The length of the head (0.22) is less than one-fourth of the total, and is double its height at the pupil (0.11); its greatest width (0.08) is about one-third of its

length. The orbit is nearly circular, and its diameter (0.05) equals the length of the snout (0.05) and the width of the interorbital area (0.05). The snout projects far beyond the lower jaw, the extremity of which just passes the vertical from the anterior margin of the orbit. The maxillary is dilated above the mandibular joint, rather tapering behind, and extends to the gill-opening. The gill-rakers are fine, setiform, not longer than the eye (0.05); about twenty-five on the lower branch of the outer branchial arch.

The origin of the dorsal fin is in front of the middle of the body (0.45 from the snout), and directly above the extremities of the ventrals. The length of the first ray (0.06) is half that of the second (0.12), which nearly equals the length of the base (0.11). The origin of the anal is at the middle of the body (0.51 from the snout), and below the posterior dorsal rays; its greatest height (0.11) nearly equals that of the dorsal. The length of the middle caudal rays (0.08) is two-fifths of that of the outer rays (0.20). The length of the pectorals (0.11) equals the length of the base of the dorsals (0.11), the extremities reaching to the origin of the ventrals. Length of ventrals, 0.09; and their distance from snout, 0.35.

Color:—Back and sides brownish; belly white; a broad, clearly-defined lateral band of silver as wide as the diameter of the orbit (0.05).

Radial formula:—D. 13-14, A. 23-24. Length, 2.68 inches (0^{m}.63).

CYPRINIDÆ.

CARASSIUS AURATUS, (*Linné*) *Bleeker.*

GOLD-FISH.

Cyprinus auratus, LINNÉ, Syst. Nat. ed. 10, i, 1758, 323.—JONES, Naturalist in Bermuda. 1863, 103.

Carassius auratus, BLEEKER, Cyprin. 255.—GÜNTHER, Cat. Fish. Brit. Mus. vii, 1868, 32,

Common in the brackish water of the ditches. Mr. Jones states that it was introduced from Demerára many years ago.

ANGUILLIDÆ.

ANGUILLA BOSTONIENSIS, (*Lesueur*) *Ayres.*

EEL.

Muræna bostoniensis, LESUEUR, Journ. Acad. Nat. Sci. Phila. i, 1817, 81.

Anguilla bostoniensis, AYRES, Boston Journ. Nat. Hist. iv, 1842, 279.—GÜNTHER, Cat. Fish. Brit. Mus. viii, 1870, 31.—GILL, in Baird's Rep. Sea Fisheries Southern New England, 1873, 811.—BAIRD, Rep. Sea Fisheries Southern New England, 1871, 826.

Common in the ditches and dikes of the salt-marshes. Mr. Jones states* that it attains the weight of two or three pounds, and is very destructive to young ducklings. It is not eaten.

I obtained a specimen measuring five inches, which I refer with some hesitation to the above species, as measurements made from specimens contracted by strong alcohol are not satisfactory. The length of the head is contained once and a half in the distance between the gill-opening and the dorsal, twice in the distance between the gill-opening and the vent. The distance between the origins of the dorsal and anal is contained once and a half in the length of the head.

MURÆNIDÆ.

GYMNOTHORAX MORINGA, (*Cuvier*) *Goode.*

SPECKLED MARAY.

Muræna maculata nigra (Black Murey), CATESBY, Nat. Hist. Carolina, Florida, and Bahamas, ii, 1743, 21, tab. 21, 174.

Muræna moringa, CUVIER, Règne Animal, 1817.—STORER, Syn. Fish N. Am. 1846, 235

Muræna moringua, RICHARDSON, Voy. H. M. S. S. Erebus & Terror, Ichth. 1846, 89.—KAUP, Cat. Apod. Fish. Brit. Mus. 1856, 89.

Gymnothorax rostratus, AGASSIZ, in Spix's Selecta Gen. et Spec. Brasil, 1829, 91, tab. 1, *a*.—MÜLL & TROSCH., Schomburgk's Hist. Barbados, 1848, 676.—POEY, Rep. ii, 1860-1, 259, 427.—COPE, Trans. Am. Phil. Soc. Phila. 1870, 483.

Murenophis rostratus, CASTELNAU, Anim. Nouv. ou Rares, Amérique du Sud, 1855, 80, pl. xlii, f. 1.

Murenophis curvilineata, CASTELNAU, op. cit. 81, pl. xlii, f. 2.

Occasional: the species occurs throughout the West Indies, at Bahia and at Saint Helena. My specimen measures three feet, and has the vertical fins edged with white. These fishes are said to attain a length of five or six feet, and are considered excellent food by the lower classes: I am told, however, that serious cases of poisoning have been occasioned by their use. The Speckled Maray is not rare, but by no means as common as the Green Maray. I saw a single specimen of the latter, but as I could not obtain it for study I was unable to determine its specific relations. It resembles closely the "Muray" of Catesby,† which I have reason to believe is not identical with his "Black Muray", as is generally supposed.

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* Naturalist in Bermuda, p. 103.

† Nat. Hist. Carolina, Florida, and Bahamas, 20, pl. xx—*Muræna maculata nigra and viridis.*

ECHIDNA CATENATA, (*Bloch*) *Bleeker.*

Gymnothorax catenatus, BLOCH, Ichth. xii, 1797, 69, taf. ccccxv.
Muræna catenata, RICHARDSON, Voyage H. M. S. S. Erebus & Terror, Ichth. 1846, 95.—GÜNTHER, Cat. Fish. Brit. Mus. viii, 1870, 131.
Pœcilophis catenatus, KAUP, Cat. Apod. Fish. Brit. Mus. 1856, 100.
Echidna catenata, BLEEKER, Ned. Tyds. Dierk. ii, 242.

Dr. Kaup (*l. c. sup.*) gives Bermuda as a locality for this species; it also occurs at many of the West India Islands, at Trinidad, and on the coast of Dutch Guiana at Surinam.

RAIÆ.

The names Sting Ray and White Ray would indicate the occurrence of one or more species of this order. *Ætobatis narinari* (Euphrasen) Müll. & Henle is likely to occur here.

LAMNIDÆ.

Mr. Jones records a specimen nearly eight feet long taken in March, 1850, which he believes to be the *Lamna punctata* figured by DeKay.*

SPHYRNIDÆ.

The Hammer-head Shark known to the fishermen is probably the *Sphyrna zygæna* (Linné) Müller & Henle.

SCYLLIIDÆ.

The large Shark confined in the Devil's Hole is probably *Ginglymostoma cirratum* (Gmelin) Müll. & Henle.

GALEORHINIDÆ.

MUSTELUS CANIS, (*Mitch.*) *DeKay.*

NURSE SHARK.

Squalus canis, MITCHILL, Trans. Lit. and Phil. Soc. N. Y., 1, 486, pl. lxiv, f. 209.
Mustelus canis, DEKAY, Zool. N. Y. Fish, 1842, 355, pl. lxiv, f. 209.—STORER, Syn. Fish. N. Am. 253.—BAIRD, Fishes New Jersey Coast, 39, 1854; Rep. U. S. Com. Fish, 1871, 827.—GILL, Cat. Fishes E. Coast N Am. 59; and in Baird's Rep. U. S. Com. Fish, 1871, 813.—POEY, Rep. Fis.-Nat. Cuba, ii, 453.

Common. My specimen measured three feet, and one of the oviducts contained a young one eight inches long. It agrees exactly with specimens of *Mustelus canis* from Wood's Hole, Mass.

The Nurse is considered excellent food; after it has been boiled until tender, and then fried in its own fat. The sharks are rarely eaten, however, except by the negroes.

* *Zoology of New York, Fish*, 352, pl. lxiii, f. 206–207.

APPENDIX.

ADDITIONAL SPECIES OBSERVED BY MR. J. MATTHEW JONES.

After the preceding pages were in type, I received from Mr. Jones a list of the species collected by him in the Bermudas. In order to represent as fully as possible the present state of knowledge in reference to the fish fauna of these islands, I venture to give below the names of those species cited by Mr. Jones which have not fallen under my personal observation. Many species are of course included both in his collection and my own. The specific names below are given on the authority of Mr. Jones, who employs the nomenclature of Dr. Günther's "Catalogue of the Fishes in the British Museum".

LIST.

Diodon maculatus.
Tetrodon rostratus.
Ostracion trigonus.
Balistes maculatus.
Monacanthus aurantiacus.
Syngnathus Jonesii.
Centriscus, sp.
Fistularia serrata.
Rhomboidichthys lunatus.
Hemirhombus aramaca.
Lefroyia bermudensis.
Brotula barbata.
Centronotus, sp.
Blennius crinitus.
Gobius soporator.
Scorpæna Plumieri.
Scarus Catesbyi.
Pseudoscarus psittacus.
Pseudoscarus sanctæ-crucis.*
Platyglossus bivittatus.
Glyphidodon cæleştinus.
Acanthurus chirurgus.
Chætodon capistratus.
Holacanthus tricolor.
Caranx dentex.
Caranx carangus.
Caranx chrysos.
Thyrsites prometheus.
Auxis Rochei.
Seriola Dumerilii.
Seriola zonata.
Trachynotus ovatus.
Coryphæna pelagica.
Coryphæna hippurus.
Mullus barbatus.
Sargus argenteus.
Mesoprion chrysurus.
Hæmulon macrostoma.

* [Probably the young of *Pseudoscarus vetula*; see discussion on page 32, *supra*

Hæmulon xanthopterum.	Saurus myops.
Serranus coronatus.	Albula conorhynchus.
Rhypticus saponaceus.	Ophichthys acuminatus.
Apogon imberbis.	Muræna miliaris.
Priacanthus macrophthalmus.	Muræna maculipinnis.
Regalecus gladius.	Muræna sanctæ-helenæ.
Belone hians.	Acipenser sturio.*
Exocœtus lineatus.	Carcharias obscurus.
Saurus fœtens.	Ætobatis narinari.

*[??]

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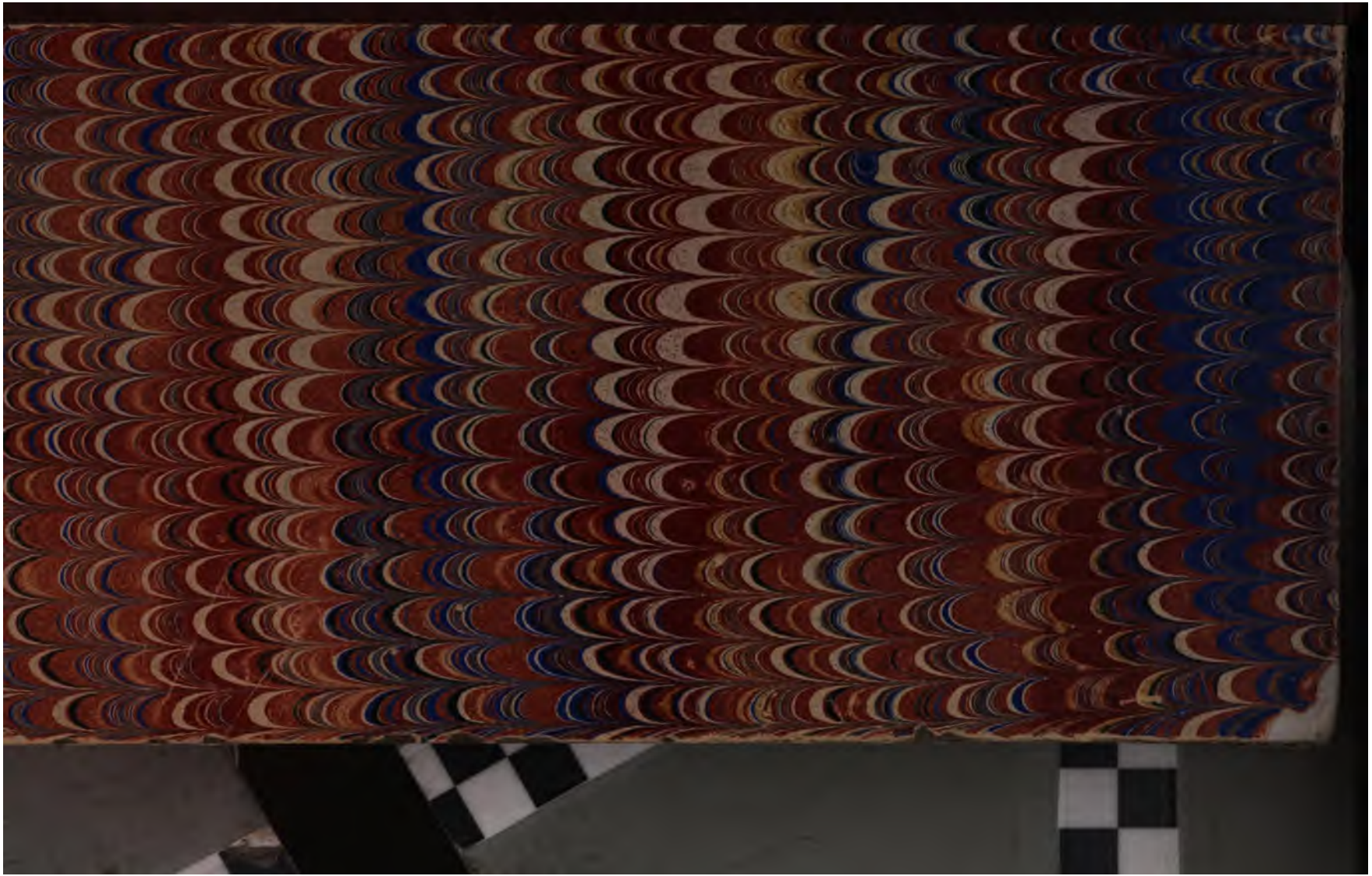
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